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ABSTRACT

This document provides activities that teach seventh grade geometric concepts by using the LOGO programming language. The entire package consists of the printed text and an accompanying diskette which is integral to the program. The package contains 17 lessons; all but two of the activities contain a pre-activity reading, a pre-activity written page, a computer activity, and a post-activity written page. The lessons deal with: (1) points in a coordinate plane; (2) the vocabulary of geometry; (3) angles; (4) circles; (5) bisecting segments and angles; (6) angle relationship; (7) perpendicular and parallel concepts; (8) polygons; (9) triangles; (10) quadrilaterals; (11) congruent polygons; (12) symmetry; (13) similar polygons; (14) solid figures; (15) transformations; (16) spirolaterals; and (17) a geometry review. Also included in the document is a LOGO dictionary and a LOGO bibliography. (TW)

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THE TEACHING OF GRADE 7 GEOMETRIC CONCEPTS USING LOGO

BY

LOUIS J. CORBOSIERO, JR.

Dr. Frederick J. Tirrell, Superintendent

Dr. Frederick B. Tuttle, Assistant Superintendent for Curriculum and Instruction

Karl H. West, Jr., Director of Mathematics

Needham Public Schools

Needham, Massachusetts 02192

1986

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INTRODUCTION

Last year, I attempted to find and to adapt or to create activities that teach grade seven geometric concepts by using the LOGO programming language. This turned out to be quite a challenge since very few educators have taken this approach to teaching geometric concepts.

In the spring of 1986, I tried out the activities with one of my mathematics classes. Even though the students enjoyed working with the computer, the expected mastery of geometric concepts was not achieved. In fact students who learned geometry in more conventional ways tested higher than the group using the computer.

Therefore, I decided to try to improve the lessons by modifying the activities. The entire package now contains seventeen lessons. Each lesson, with the exception of the last two, now contains four parts:

1) a pre-activity reading

2) a pre-activity written page

3) a computer activity

4) a post-activity written page

Hopefully, with these added features, the expected mastery of geometric concepts can be achieved.

DICTIONARY OF LOGO COMMANDS

These pages are designed to be use for review and reference. They have been divided into seven sections:

1. LOGO PRIMITIVES
2. SCREEN DISPLAY COMMANDS
3. COMMANDS TO CORRECT TYPING ERRORS
4. COMMANDS TO DEFINE AND TO EDIT PROCEDURES
5. MEMORY COMMANDS
6. DISK COMMANDS
7. ERROR MESSAGES

As you progress through these activities, you will find these sections extremely useful.

DICTIONARY OF LOGO COMMANDS

LOGO PRIMITIVES

FD # (FORWARD) moves the turtle # steps in the direction it is pointing

BK # (BACKWARD) moves the turtle # steps in the opposite direction from which it is pointing.

RT # (RIGHT) turns the turtle # degrees to the right

LT # (LEFT) turns the turtle # degrees to the left

PD (PENDOWN) leaves a trail when the turtle moves

PU (PENUP) leaves no trail when the turtle moves

HT (HIDETURTLE) makes the turtle disappear

ST (SHOWTURTLE) makes the turtle reappear

REPEAT # [COMMANDS] makes the turtle repeat the commands within the [ ] # times

PC # (PENCOLOR) changes the color in which the turtle is drawing according to the following numbers: 0 - black; 1 - white; 2 - green; 3 - violet; 4 - orange; 5 - blue.

BG # (BACKGROUND) changes the background (screen) color according to the following numbers: 0 - black; 1 - white; 2 - green; 3 - violet; 4 - orange; 5 - blue; 6 - reverse.

TS (TURTLESTATE) tells the user four pieces of information in this form: [TRUE TRUE 0 1] which means PENDOWN SHOWTURTLE BACKGROUND COLOR IS 0 PENCOLOR IS 1.

HEADING tells the user in which direction (# of degrees) the turtle is pointing

SETHEADING # sets the heading of the turtle to the right # of degrees specified

SETXY # # moves the turtle to the (X,Y) coordinate given.

DICTIONARY OF LOGO COMMANDS

SCREEN DISPLAY COMMANDS

DRAW shows the turtle in the center of the screen pointing at 0 degrees.

CTRL S (SPLITSCREEN) splits the screen to give four lines of typing space at the bottom with graphics above.

CTRL T (TEXTSCREEN) gives entire screen to text.

CTRL F (FULLSCREEN) gives full screen of graphics.

CS (CLEARSCREEN) clears the screen of all graphics, but the turtle remains at the current position and heading.

HOME moves the turtle to the original starting position. If PD, turtle will leave a trail.

WRAP lets the turtle go off the screen on one side and reappear on the opposite side. This will automatically happen.

NOWRAP prevents the turtle from going off the screen. If your input is too large, you will get an error message of TURTLE OUT OF BOUNDS.

COMMANDS TO CORRECT TYPING ERRORS

ESC (ESCAPE KEY) deletes character before the cursor and moves cursor to the left one space.

→ moves the cursor to the right without erasing.

← moves the cursor to the left without erasing.

CTRL A moves the cursor to the beginning of the current line.

CTRL E moves the cursor to the end of the current line.

CTRL D deletes the character under the cursor.

CTRL K deletes all the characters on the current line.

DICTIONARY OF LOGO COMMANDS

COMMANDS TO DEFINE AND EDIT PROCEDURES

TO * lets the computer know that you are ready to create or change a procedure called *.

CTRL C tells the computer to remember the procedure and exit the edit mode.

CTRL G tells the computer to leave the edit mode without defining a procedure.

CTRL P moves the cursor up the screen to the previous line.

CTRL N moves the cursor down the screen to the next line.

CTRL O opens up a space to insert a line of text.

Besides these commands, the ones in the section entitled: CORRECTING TYPING ERRORS may also be used.

MEMORY COMMANDS

ERASE * erases the procedure named * from the computer's memory.

ERASE ALL erases all the procedures in the current workspace.

POTS prints out the titles of all the procedures in the current workspace.

PO * prints the list of commands that describe the procedure called *.

PO ALL prints the list of all the commands of all the procedures created in the current workspace.

DICTIONARY OF LOGO COMMANDS

DISK COMMANDS

CATALOG displays the titles of each file saved on the disk.

READ "* reads a set of procedures (file) called * from the disk.

SAVE "* saves the set of procedures (file) called * onto the disk.

ERASEFILE "* erases a file called * from the disk.

READPICT "* reads a picture called * from the disk.

SAVEPICT "* saves a picture called * from the screen onto the disk.

ERASEPICT "* erases a picture called * from the disk.

ERRORS MESSAGES

THERE IS NO PROCEDURE NAMED * turtle doesn't know the word - word hasn't been defined for the turtle.

* NEEDS MORE INPUT turtle needs number(s) to in order to do the task requested.

LESSON 1

POINTS IN A COORDINATE PLANE

CHECKLIST OF ACTIVITIES

_____1. READ: PAGE 8

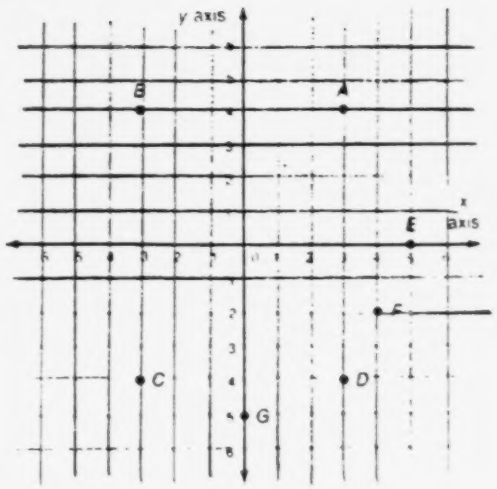
_____2. WRITE: PAGE 9

_____3. DO COMPUTER ACTIVITY: PAGES 10-12

_____4. WRITE: PAGE 13

Points in a Coordinate Plane

This drawing shows a **coordinate plane.**



A coordinate plane has a horizontal number line (the x axis) and a vertical number line (the y axis).

These axes intersect at a point called the **origin**.

You can use an **ordered pair** of numbers to locate a point in the plane.

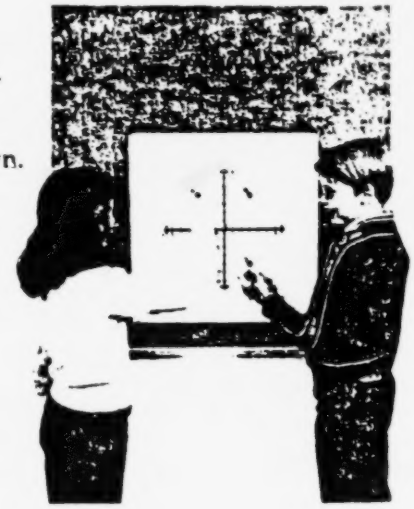
The first number tells the direction and the number of spaces to move horizontally.
The second number tells the direction and the number of spaces to move vertically.
Always start at the origin.

The ordered pair (3, 4) means start at the origin,
move 3 spaces to the right,
move 4 spaces up.
The ordered pair (3, 4) locates point A.

The ordered pair ($^-3$, 4) locates point B.
Point B is 3 spaces to the left and 4 spaces up.

The ordered pair ($^-3$, $^-4$) locates point C.
Point C is 3 spaces to the left and 4 spaces down.

The ordered pair (3, $^-4$) locates point D.
Point D is 3 spaces to the right and 4 spaces down.



Some points are located on an axis.
The ordered pair (5, 0) locates point E.

You can write ordered pairs for given points.

The ordered pair for point F is (4, $^-2$).
The ordered pair for point G is (0, $^-5$).
The ordered pair for the origin is (0, 0).

The numbers in an ordered pair are called the **coordinates** of the point.

name

RETEACHING

WORKSHEET **157**

Points in a Coordinate Plane

You can use an ordered pair of numbers to locate a point in a plane.

The ordered pair (⁻4, 5) means

Step 1 Start at 0.

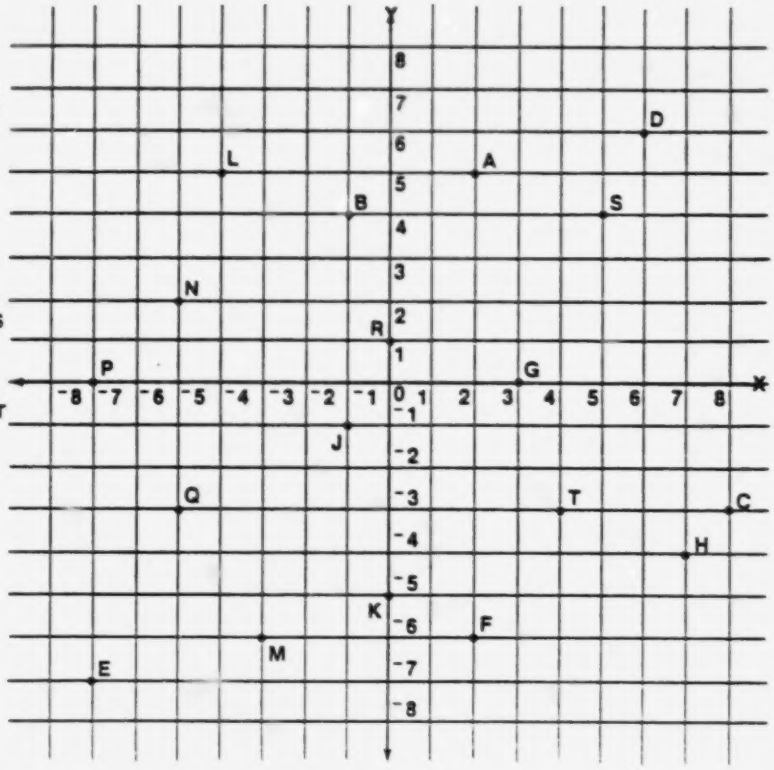
Step 2 Move 4 spaces to the left.

Step 3 Move 5 spaces up.

The ordered pair (⁻4, 5) locates point L.

M is located by the ordered pair (⁻3, ⁻6).

Think: 3 spaces to the left
6 spaces down



What letter is at the point? ***Remember:*** Always start at 0.

1. 8 spaces to the right
3 spaces down _____

2. 5 spaces to the right
4 spaces up _____

3. 3 spaces to the right
0 spaces up _____

4. 1 space to the left
4 spaces up _____

5. (⁻7, 0) _____ **6.** (0, ⁻5) _____ **7.** (6, 6) _____ **8.** (2, ⁻6) _____

Complete.

9. H is _____ spaces to the right and _____ spaces down.

10. T is _____ spaces to the right and _____ spaces down.

11. E is _____ spaces to the left and _____ spaces down.

12. N is _____ spaces to the left and _____ spaces up.

Write the ordered pair for the point.

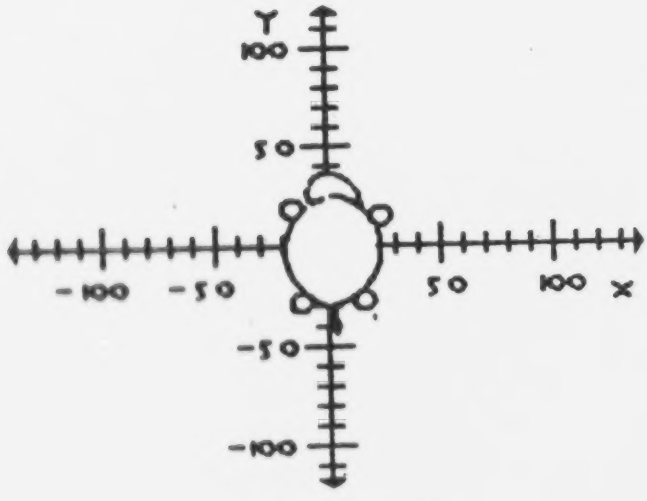
13. R _____ **14.** A _____ **15.** J _____ **16.** Q _____

Use with text pages 426–427.

LESSON 1

THE COMMAND: SETXY

A way to make a figure in LOGO is with a coordinate system like the one below.



The Turtle's World

The turtle is located at 0 0 in its world by an x-coordinate (horizontal distance from 0) and a y-coordinate (vertical distance from 0).

SETXY can be used to move the turtle by changing the x-coordinate and the y-coordinate.

For example, TYPE: DRAW SETXY 15 (-20)

NOTE: SECOND NUMBER MUST BE IN () IF IT IS NEGATIVE

Notice the turtle has drawn a line segment from 0 0 (starting position) to the point 15 (-20).

Now try this: TYPE: DRAW PU SETXY 100 (-20)

and notice the turtle moved but left no trail.

LESSON 1 - THE COMMAND: SETXY

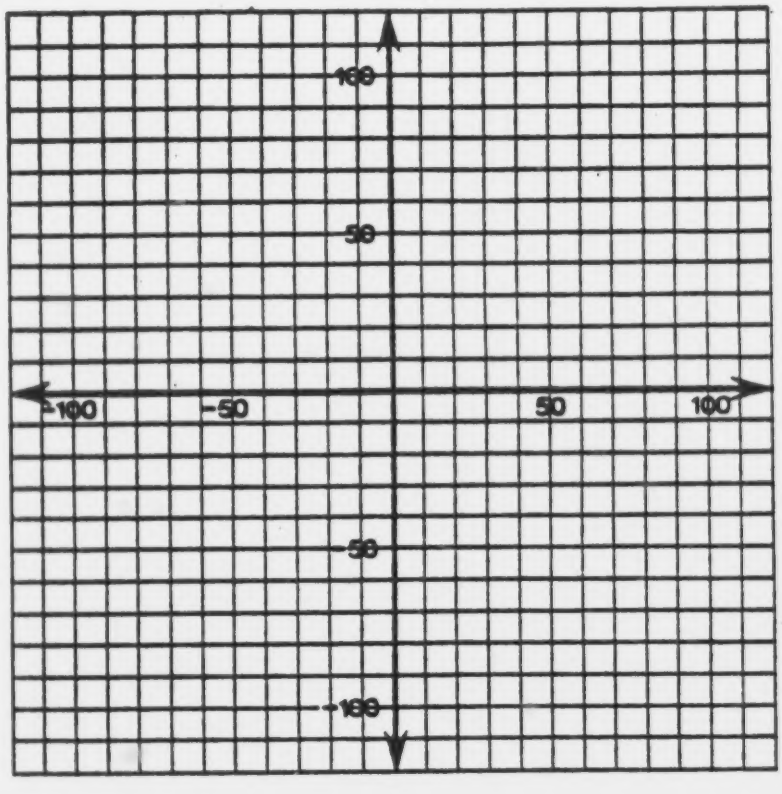
DO THIS: Use the series of commands below to explore the use of SETXY.

1. Record the turtle's position on the "Turtle World Grid" to the right of the procedure.

2. After filling in the "Turtle World Grid", then type the procedure: TO COORDINATE

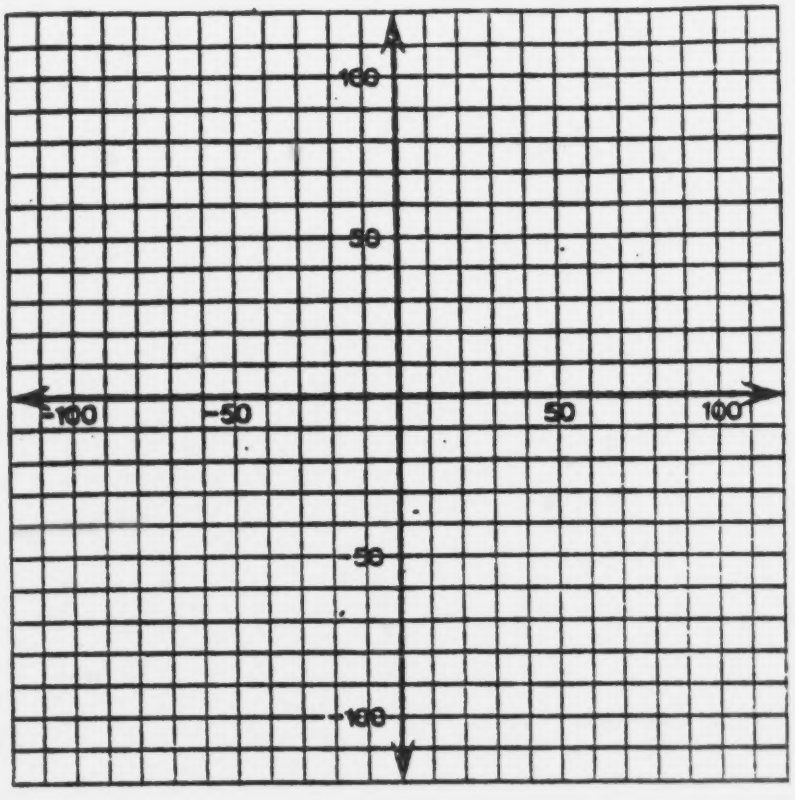
```
TO COORDINATE
PU SETXY -100 (-50) PD
SETXY -70 (-50)
SETXY -30 0
SETXY -70 50
SETXY -100 0
SETXY -70 50
SETXY 70 50
SETXY 100 0
PU SETXY -30 50 PD
SETXY -30 100
SETXY 30 100
SETXY 30 50
SETXY 70 50
SETXY 30 0
SETXY -30 0
PU SETXY 30 0 PD
SETXY 70 (-50)
SETXY 100 (-50) HT
```

Turtle's World



3. Finally, create a picture of your own using SETXY. Use the extra grid below to help plan your picture.

Turtle's World



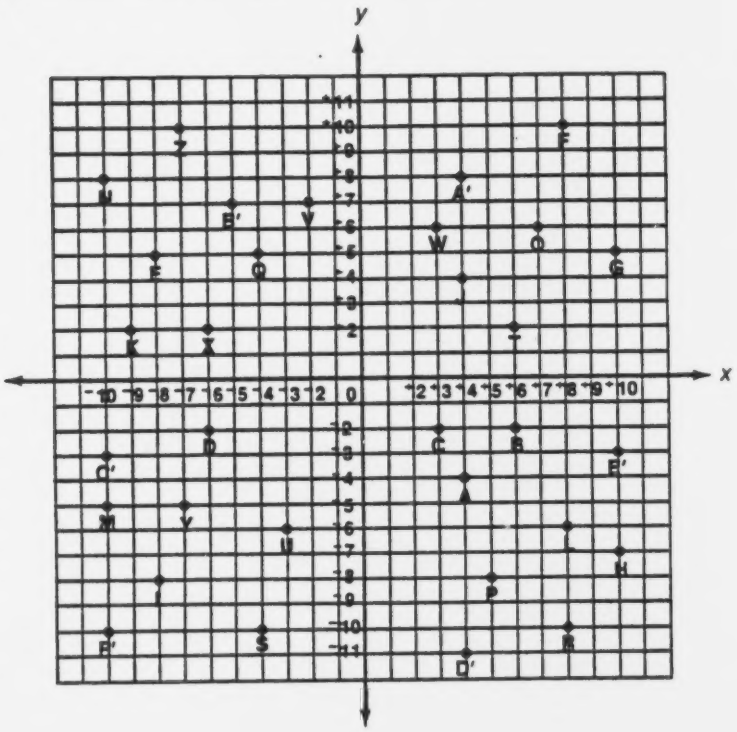
Remember save all procedures as LESSON.1

name

PRACTICE

WORKSHEET **157**

Points in a Coordinate Plane



You use an **ordered pair** of numbers to locate a point in **a coordinate plane.**

The first number tells the direction and the spaces to move horizontally.

The second number tells the direction and the spaces to move vertically.

$(^-6, 2)$ → 6 spaces to the left, 2 spaces up. Point *X*.

Practice • What is the letter at the point?

1. $(^-9, 2)$ _____
2. $(^-7, ^-5)$ _____
3. $(8, 10)$ _____
4. $(^-4, 5)$ _____
5. $(5, ^-8)$ _____
6. $(4, ^-4)$ _____
7. $(^-4, ^-10)$ _____
8. $(^-2, ^-6)$ _____
9. $(6, 2)$ _____
10. $(8, ^-6)$ _____
11. $(10, 5)$ _____
12. $(^-6, 2)$ _____
13. $(4, ^-11)$ _____
14. $(^-6, ^-2)$ _____
15. $(10, ^-7)$ _____
16. $(^-10, ^-10)$ _____
17. $(4, 4)$ _____
18. $(3, ^-2)$ _____
19. $(^-10, 8)$ _____
20. $(4, 8)$ _____

Write the ordered pair for the point.

21. C′ _____
22. W _____
23. G _____
24. Y _____
25. M _____
26. D _____
27. Q _____
28. V _____
29. F _____
30. I _____
31. S _____
32. H _____
33. N _____
34. J _____
35. R _____
36. B _____
37. Z _____
38. P _____
39. U _____
40. O _____

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1 3

Use with text pages 426–427.

LESSON 2

THE VOCABULARY OF GEOMETRY

CHECKLIST OF ACTIVITIES

_____1. READ: PAGE 15

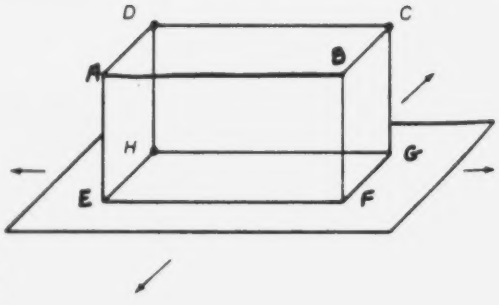
_____2. WRITE: PAGE 16

_____3. DO COMPUTER ACTIVITY: PAGES 17-19

_____4. WRITE: PAGE 20

The Vocabulary of Geometry

A fish tank has many examples of geometric figures.



A **point** is a location. The corners *E* and *F* are examples of points.

A **plane** is a flat surface that has no end.

Points *E*, *F*, and *G* all lie in the same plane. A plane can be named by using three points in it. Find plane *EFG*.

A **line segment** is straight. It has two **endpoints.** Each edge of the tank is an example of a line segment. Find segment *AB*. Its endpoints are *A* and *B*.

The symbol for segment *AB* is $\overline{AB}$. Read: segment AB

Here are some other basic figures in geometry.

A **line** has no endpoints. The arrowheads show that it goes on forever in both directions.

Symbol

$\overleftrightarrow{XY}$

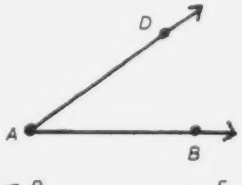
Read:
line *XY*

A **ray** has only one endpoint. It goes on forever in one direction. Ray *XY* has the endpoint *X*. It continues on through *Y*. The arrowhead shows that the ray continues on forever in that direction. In naming a ray, the letter for the endpoint is written first.

$\overrightarrow{XY}$

Read:
ray *XY*

Two rays that have the same endpoint form an **angle.** Rays *AD* and *AB* form angle *DAB*. Point *A* is the **vertex** of the angle. The letter for the vertex is written in the middle.



$\angle DAB$

Read:
angle *DAB*

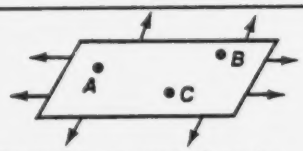
In this drawing two lines **intersect** at a point. Name the point of intersection.

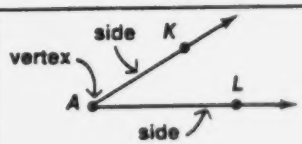
name

RETEACHING

WORKSHEET **108**

The Vocabulary of Geometry

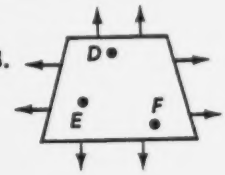
Line Segment	Line	Plane
Name: $\overline{ST}$ or $\overline{TS}$	**Name:** $\overleftrightarrow{DE}$ or $\overleftrightarrow{ED}$	 Points *A*, *B*, and *C* lie in the same plane.

Ray	Angle	Intersecting Lines
Name: $\overrightarrow{FG}$	 **Name:** Angle *KAL* ($\angle KAL$) or Angle *LAK* ($\angle LAK$)	Intersecting lines meet or cross each other at a point. $\overleftrightarrow{DE}$ intersects $\overleftrightarrow{PQ}$ at *R*.

Name the figures.

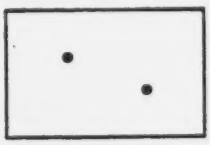
1.

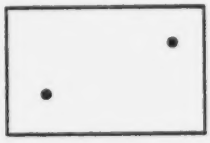
2.

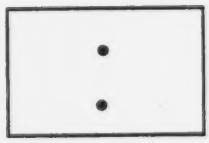
3. 

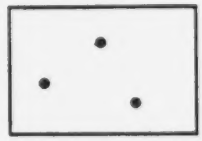
4.

Label the points in each box. Complete the figures.

5. $\overleftrightarrow{JK}$ 

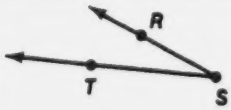
6. $\overline{CD}$ 

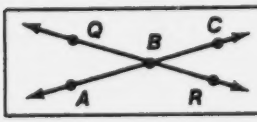
7. $\overrightarrow{RS}$ 

8. $\angle ABC$ 

Complete.

9.

Figure	Name	Vertex	Sides
	$\angle$ _____ or $\angle$ _____	Point _____	_____ and _____

10. 

$\overleftrightarrow{AC}$ intersects $\overleftrightarrow{QR}$ at _____.

$\overleftrightarrow{QR}$ intersects $\overleftrightarrow{AC}$ at _____.

1 6

Use with text pages 304–305.

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LESSON 2

THE VOCABULARY OF GEOMETRY

TRY THIS: [MAKE SURE YOUR DATA DISK IS IN THE DRIVE]

TYPE: READ *LETTERS

TYPE: READ *ARROWS

TYPE: TO POINT.A

TYPE: FD 1 HT PU BK 15 PD PC 2 A PU PC 1

TYPE: CTRL C

TYPE: DRAW POINT.A

What should appear on the screen is one point. One exact location on the screen named point A.

Now you have the ability to place a point A anywhere on the screen.

TYPE: TO SEGMENT.CF

TYPE: HT FD 50 PU RT 90 FD 5 LT 90

PC 3 PD C BK 60 PD PC 4 F PU PC 1

TYPE: CTRL C

TYPE: DRAW SEGMENT.CF

What appears on the screen is a line segment.

Even though it appears solid, it is really made up of points.

It's name is $\overline{CF}$ or $\overline{FC}$.

Now you can draw a line segment $\overline{CF}$ anywhere on the screen.

LESSON 2 - THE VOCABULARY OF GEOMETRY

```
TYPE:  TO RAY.TL
TYPE:  LT 45 FD 50 ARROW BK 10 PU
       RT 90 FD 5 LT 45 PC 2 PD L
       RT 135 FD 30 LT 135 PD PC 3 T PU PC 1
TYPE:  CTRL C
TYPE:  DRAW RAY.TL
```

What appears on the screen is a ray, TL.

A ray actually extends forever. You can't show this on the screen because the ray will WRAP around.

The ray's name is TL. The symbolism is $\overrightarrow{TL}$.

```
TYPE:  TO LINE.EX
TYPE:  HT RT 140 FD 100 ARROW BK 100
       RT 180 ARROW PU BK 10 RT 90
       FD 15 RT 140 PD PC 4 X RT 140
       FD 65 LT 140 BK 10 PD PC 5 E
       PC 1 PU
TYPE:  CTRL C

TYPE:  DRAW LINE.EX
```

What appears on the screen is line EX or XE.

The symbolism is $\overleftrightarrow{EX}$ or $\overleftrightarrow{XE}$.

LESSON 2 - THE VOCABULARY OF GEOMETRY

Now that you have seen how points, segments, rays, and lines can be draw on a plane(screen), write a procedure, called TO VOCABULARY that will use SETXY to produce the result below. Use the outline provided below. When finished, save as LESSON.2 on your data disk.

```
TO VOCABULARY

PU SETXY _____ _____

PD POINT.A

SETXY _____ _____

PD SEGMENT.CF

SETXY _____ _____

PD RAY.TL

SETXY _____ _____

PD LINE.EX
```

name

PRACTICE

WORKSHEET **108**

The Vocabulary of Geometry

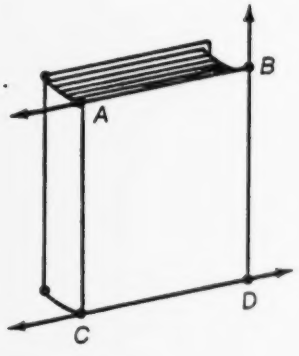
A book cover has many examples of geometric figures.
The corners are examples of **points.**
Points **A, B, C,** and **D** all lie in the same **plane.**

Line segment *AB* ($\overline{AB}$) has *A* and *B* as **endpoints.**

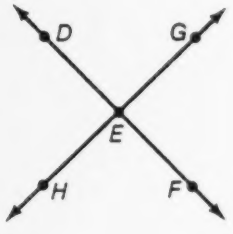
Line segment *CD* is part of **line** *CD* ($\overleftrightarrow{CD}$).

Ray *DC* ($\overrightarrow{DC}$) is also part of line *CD.*

Ray *DC* ($\overrightarrow{DC}$) and Ray *DB* ($\overrightarrow{DB}$) form **angle** *CDB* ($\angle CDB$).



Practice • Use this drawing of two intersecting lines.



1. Name the point of intersection. _____
2. Name the two lines. _____
3. Name two line segments on $\overleftrightarrow{HG}$. _____
4. Name two rays on $\overleftrightarrow{DF}$. _____
5. Name the angle formed by $\overrightarrow{EH}$ and $\overrightarrow{EF}$. _____

Mixed Practice • Use the drawing above for exercises 6 through 10.

6. Name two line segments on $\overrightarrow{DF}$. _____
7. Name two rays on $\overleftrightarrow{HG}$. _____

Name the angle formed by

8. $\overrightarrow{EH}$ and $\overrightarrow{ED}$. _____
9. $\overrightarrow{ED}$ and $\overrightarrow{EG}$. _____
10. $\overrightarrow{EG}$ and $\overrightarrow{EF}$. _____

Draw and label the figures.

11. $\overline{MN}$
12. $\overleftrightarrow{EF}$
13. $\angle XYZ$
14. $\overrightarrow{SW}$
15. plane *ABC*
16. $\angle MLJ$
17. $\overrightarrow{TH}$
18. point *K*
19. $\overline{QR}$

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Use with text pages 304–305.

LESSON 3

ANGLES

CHECKLIST OF ACTIVITIES

_____1. READ: PAGE 22

_____2. WRITE: PAGE 23

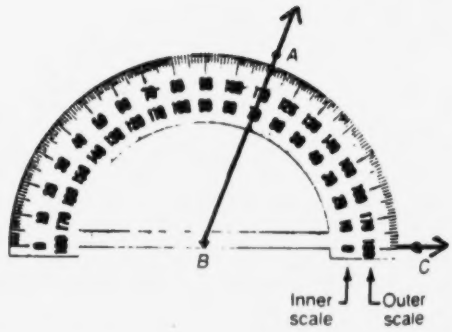
_____3. DO COMPUTER ACTIVITY: PAGES 24-26

_____4. WRITE: PAGE 27

Angles

The unit of measure for an angle is a **degree** (1°).

A **protractor** is used to measure angles. It has an inner scale and an outer scale. Place the protractor so that the center mark is on the vertex of the angle. Place the inner 0° mark on one side of the angle. Read the inner scale where the other side crosses the protractor.

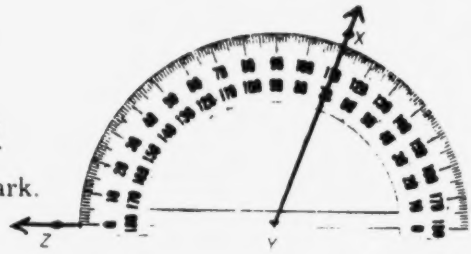


The measure of $\angle ABC$ is 70° (not 110°).

$$m\angle ABC = 70°$$

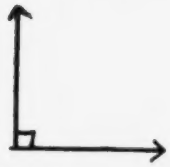
You can also use a protractor to draw angles. Draw $\angle XYZ$ with a measure of 110°. Follow the directions.

1. Draw $\overrightarrow{YZ}$.
2. Place the protractor so that the center mark is at point Y.
3. Line up the outer 0° mark with $\overrightarrow{YZ}$.
4. Locate point X at the outer 110° mark.
5. Draw $\overrightarrow{YX}$.



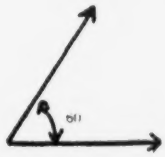
Angles are classified by their measures.

Right Angle



The measure of a **right angle** is 90°.

Acute Angle



The measure of an **acute angle** is greater than 0° and less than 90°.

Obtuse Angle

The measure of an **obtuse angle** is greater than 90° and less than 180°.

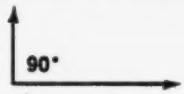
What kind of angle is $\angle ABC$ near the top of this page?
What kind of angle is $\angle XYZ$?

name

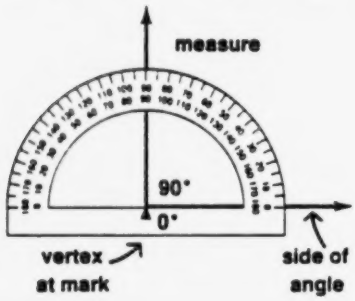
RETEACHING

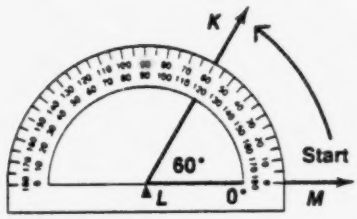
WORKSHEET **109**

Angles

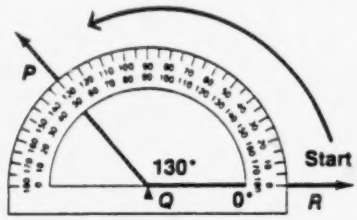
Right Angle	Acute Angle	Obtuse Angle
 The measure of a right angle is 90°.	The measure of an acute angle is greater than 0° and less than 90°.	The measure of an obtuse angle is greater than 90° and less than 180°.

You can use a protractor to measure angles.





$\angle KLM = 60°$

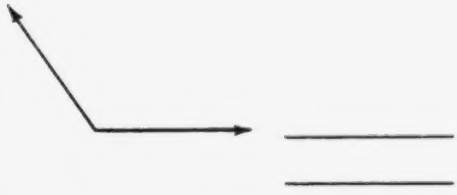


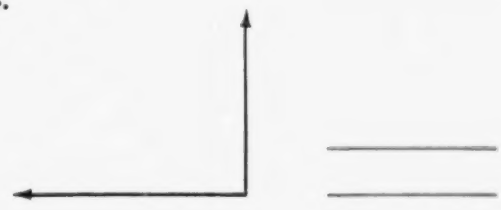
$\angle PQR = 130°$

Measure the angles. Then write *right*, *acute*, or *obtuse*.

1.

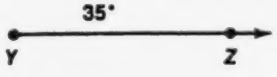
2.

3. 

4. 

Use a protractor to complete each angle.

5. $\angle XYZ = 35°$



6. $\angle BAC = 150°$

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23

Use with text pages 306–307.

LESSON 3

ANGLES

DEFINITION: An angle is the union of two rays with a common endpoint.

TRY THIS: [MAKE SURE YOUR DATA DISK IS IN THE DRIVE]

```
TYPE:  READ "LETTERS
TYPE:  READ "RAY
TYPE:  READ "ARROWS
TYPE:  DRAW
TYPE:  HT RT 90 FD 1 PU LT 90
       BK 15 PD PC 5 A PC 1
```

This point will be the VERTEX of the angle, the point from which the 2 RAYS will originate.

```
TYPE:  HOME RT 90 FD 1 PD
       RAY LT 45 RAY
```

Now you have angle A.

The symbolism is ∠A.

Each ray is called a SIDE of the angle.

Teach the turtle to draw different size angles:

```
TYPE:  TO ANGLE :DEGREES
       RT 90 RAY
       LT :DEGREES RAY HT
TYPE:  CTRL C
```

LESSON 3 - ANGLES

TYPE: DRAW ANGLE 90

What appears on the screen is a right angle which measures exactly 90 degrees.

TYPE: DRAW ANGLE 75

Now you get an acute angle. An acute angle measures less than 90 degrees but greater than 0 degrees.

TYPE: DRAW ANGLE 135

You now have an obtuse angle. An obtuse angle measures greater than 90 degrees but less than 180 degrees.

TYPE: DRAW ANGLE 180

This is a straight angle. It looks just like a straight line and measures exactly 180 degrees.

DO THIS: Using your cellophane protractor, measure each angle that appears on the screen. Also tell what kind of angle it is, and make a sketch.

TYPE: READ "ANGLES

#degrees angle kind sketch

1. TYPE: DRAW ANGLE.1

2. TYPE: DRAW ANGLE.2

3. TYPE: DRAW ANGLE.3

4. TYPE: DRAW ANGLE.4

5. TYPE: DRAW ANGLE.5

LESSON 3 - ANGLES

6. TYPE: DRAW ANGLE.6

7. TYPE: DRAW ANGLE.7

8. TYPE: DRAW ANGLE.8

9. TYPE: DRAW ANGLE.9

10. TYPE: DRAW ANGLE.10

11. Write a procedure that uses SETXY and ANGLE:DEGREES to display on the screen one of each kind of angle. Call this procedure TO KINDS.OF.ANGLE

Remember: When done, save as LESSON.3

name

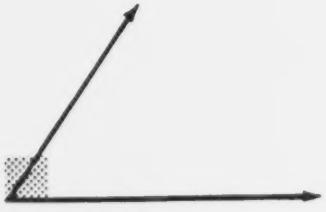
PRACTICE

WORKSHEET **109**

Angles

The unit of measure for an angle is a **degree (1°)**.

This angle is a **right angle.** The measure of a right angle is 90°.

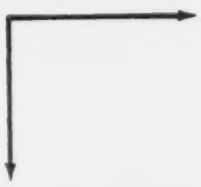


This angle is an **acute angle.** The measure of an acute angle is greater than 0° and less than 90°.

This angle is an **obtuse angle.** The measure of an obtuse angle is greater than 90° and less than 180°.

Practice • Measure each angle. Then write *right*, *acute*, or *obtuse*.

1.

2. 

3.

4.

5.

6.

7.

8.

Find the measure of each angle.

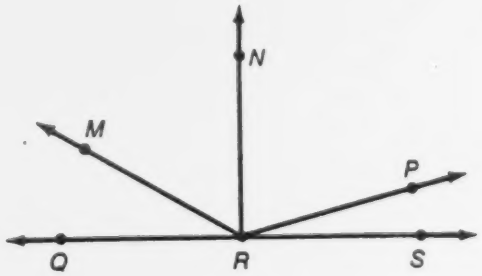
9. m ∠ *QRS* = _____

10. m ∠ *MRN* = _____

11. m ∠ *MRP* = _____

12. m ∠ *QRP* = _____

13. m ∠ *NRS* = _____



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LESSON 4

CIRCLES

CHECKLIST OF ACTIVITIES

_____1. READ: PAGE 29

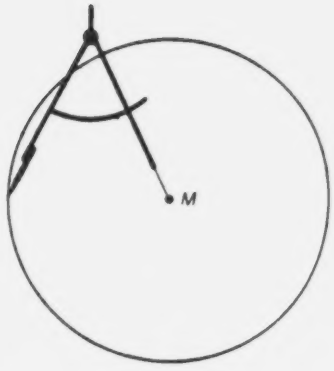
_____2. WRITE: PAGE 30

_____3. DO COMPUTER ACTIVITY: PAGES 31-35

_____4. WRITE: PAGE 36

Circles

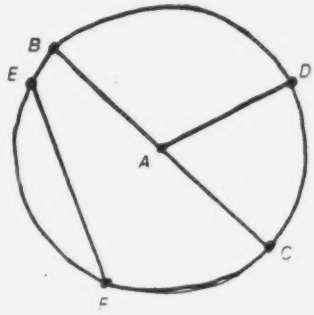
Point M is the **center** of this **circle.** All the points on the circle are the same distance from the center. A circle is named by its center. This drawing shows circle M.



A **compass** can be used to construct a circle or a part of a circle.

Segments related to a circle have special names.

Radius	A segment with endpoints that are the center of the circle and a point on the circle.	$\overline{AD}$
Chord	A segment with endpoints on the circle.	$\overline{EF}$
Diameter	A chord that passes through the center of the circle.	$\overline{BC}$



An **arc** is part of a circle. $\overset{\frown}{XZ}$ is an arc. $\frown$ means arc.

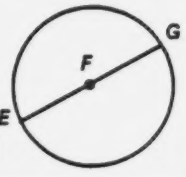
A **central angle** is an angle with its vertex at the center of the circle. $\angle XYZ$ is a central angle.

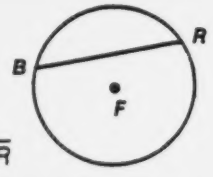
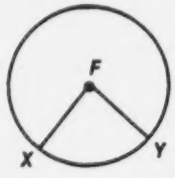
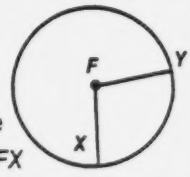
name

RETEACHING

WORKSHEET **110**

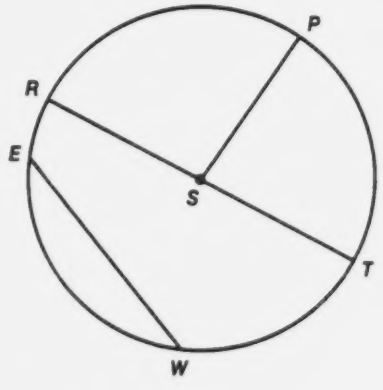
Circles

Circle	Radius	Diameter
Circle F	Radius $\overline{FG}$	 Diameter $\overline{EG}$

Chord	Arc	Central Angle
 Chord $\overline{BR}$	 Arc $\overset{\frown}{XY}$	 Central angle $\angle XFY$ or $\angle YFX$

Complete. Name

1. the circle. _____
2. three radii. _____ _____ _____
3. two chords. _____ _____
4. the diameter. _____
5. two arcs. _____ _____
6. two central angles. _____ _____



Use a compass.

7. Use $\overline{HJ}$ as a radius to construct circle H.
8. Draw circle R.

On circle R, draw and label

9. diameter $\overline{HB}$.
10. radius $\overline{RV}$.
11. chord $\overline{KL}$.
12. central angle CRQ.

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30 Use with text pages 308–309.

LESSON 4

CIRCLES

Teach the turtle this procedure to draw a circle.

```
TYPE:  TO CIRCLE :SIZE
       PU LT 90 FD (72 * :SIZE / 3.14) /2
       RT 90 PD
       REPEAT 72 [FD :SIZE RT 5]
       HT
TYPE: CTRL C

TYPE: DRAW CIRCLE 7
```

A circle should appear on the screen.

To find the center of the circle:

```
TYPE:  TO CENTER :SIZE
TYPE:  PU RT 90 FD (72 * :SIZE / 3.14) / 2
       PD PC 4 FD 1 PC 1
TYPE:  CTRL C
TYPE:  DRAW CIRCLE 7 CENTER 7
```

Is the orange point equidistant from the circle ? _____

Use your ruler to see if it is. It is _____ cm from the circle.

LESSON 4 - CIRCLES

```
TYPE:  TO CHORD :SIZE

TYPE:  PU HOME PU FD (75 * :SIZE /3.14) /2
       LT 135 PD PC 2
       FD .23 * 72 * :SIZE
       PC 1 HT
TYPE:  CTRL C
TYPE:  DRAW CIRCLE 7 CHORD 7
```

The chord is _____ cm long.

```
TYPE: TO DIAMETER :SIZE
TYPE: PU HOME LT 60
      BK 72 * :SIZE/3.14/2
      PD PC 3 FD 72 * :SIZE / 3.14
      PC 1 HT
TYPE: CTRL C
TYPE: CIRCLE 7 DIAMETER 7
```

Take your ruler and measure the diameter in centimeters. It is _____ cm long.

LESSON 4 - CIRCLES

```
TYPE:  TO RADIUS :SIZE
TYPE:  PU HOME RT 60 PD
       PC 5
       FD 72 * :SIZE / 3.14 / 2 PC 1 HT
TYPE:  CTRL C
TYPE:  CIRCLE 7 RADIUS 7
```

Carefully, measure the radius of the circle in centimeters. It is _____ cm long.

Compare the radius and diameter. How do they compare in size ?

_____

```
TYPE: TO CENTRAL.ANGLE :SIZE
TYPE: PU HOME LT 135 PD PC 4
      FD 72 * :SIZE / 3.14 / 2
      BK 72 * :SIZE / 3.14 / 2
      LT 30
      FD 72 * :SIZE / 3.14 / 2
      PC 1 HT
TYPE: CTRL C
TYPE: CIRCLE 7 CENTRAL.ANGLE 7
```

The central angle measures _____ degrees.

LESSON 4 - CIRCLES

NOW WRITE ONE PROCEDURE THAT WILL DRAW A CIRCLE, ITS CENTER, A CHORD, A DIAMETER, A RADIUS, AND A CENTRAL ANGLE ALL ON ONE CIRCLE

DEFINITION: An arc is a piece of the circle.

Teach the turtle to draw an arc.

```
TYPE: TO ARC :LENGTH
      REPEAT :LENGTH [FD 10 RT 10]
      HT
```

TRY THIS:

TYPE: DRAW ARC 3

TYPE: ARC 4

TYPE: ARC 10

TYPE: continue until you get back where you started.

LESSON 4 - CIRCLES

DEFINITION: A semicircle is half of a circle.

TRY THIS: Write a procedure using ARC to draw a semicircle.

Remember: When done, save as LESSON.4

name

PRACTICE

WORKSHEET **110**

Circles

This drawing shows **circle** *D*.

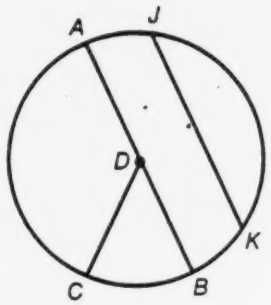
Point *D* is the **center** of the circle.

$\overline{DC}$ is a **radius,** $\overline{AB}$ is a **diameter** and

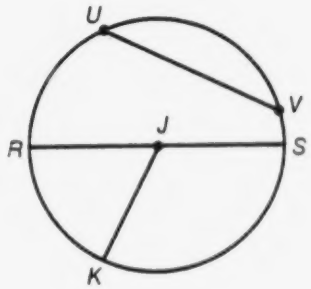
$\overline{JK}$ is a **chord** of the circle.

CB is an arc.

$\angle CDB$ is a **central angle.**

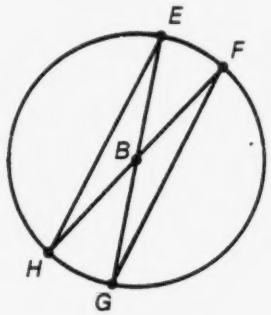


Practice • Use this drawing for exercises 1 through 6.



1. Name the circle. _____
2. Name three radii. _____
3. Name two chords. _____
4. Name a diameter. _____
5. Name three arcs. _____
6. Name a central angle. _____

Use this drawing for exercises 7 through 12.



7. Name the center of the circle. _____
8. Name four radii. _____
9. Name four chords. _____
10. Name two diameters. _____
11. Name four arcs. _____
12. Name four central angles. _____
13. Use a compass to construct circle *S*.
14. On circle *S*, draw and label six points, *U*, *V*, *W*, *X*, *Y*, and *Z*.
15. For circle S, draw and name six radii. _____
16. Draw and name six chords. _____
17. Name five arcs. _____
18. Name six central angles. _____

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Use with text pages 308–309.

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Use with text pages 308–309.

LESSON 5

BISECTING SEGMENTS & ANGLES

CHECKLIST OF ACTIVITIES

_____1. READ: PAGES 38-39

_____2. WRITE: PAGES 40-41

_____3. DO COMPUTER ACTIVITY: PAGES 42-47

_____4. WRITE: PAGES 48-49

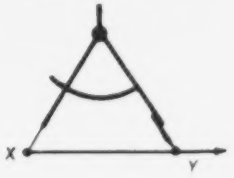
Constructing Congruent Segments and Angles

Congruent segments have the same length. A compass and a straightedge can be used to **construct** a segment congruent to $\overline{AB}$.

Step 1
Draw a ray with endpoint X.

Step 2
Open the compass the length of $\overline{AB}$.

Step 3
Place the compass point at X. Use the same compass opening to mark point Y.

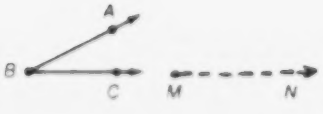


Segment XY is congruent to segment AB. $\overline{XY} \cong \overline{AB}$.

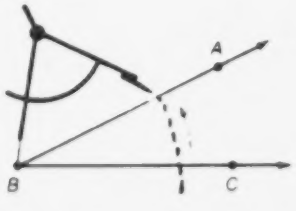
is congruent to

Congruent angles have the same measure. Construct an angle congruent to $\angle ABC$. Use a compass and a straightedge.

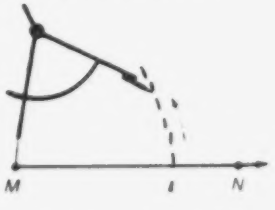
Step 1
Draw $\overline{MN}$.



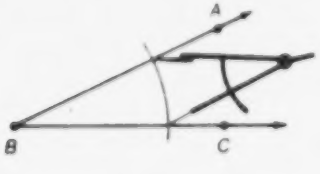
Step 2
Draw an arc through $\angle ABC$ as shown.



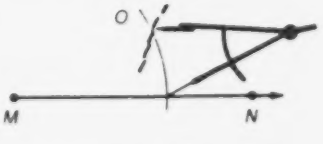
Step 3
Use the same compass opening to draw an arc through $\overline{MN}$ as shown



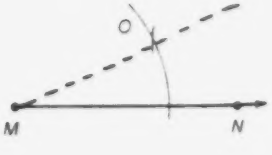
Step 4
Measure the opening of the angle as shown



Step 5
Use the same compass opening to locate point O as shown.



Step 6
Draw $\overrightarrow{MO}$.



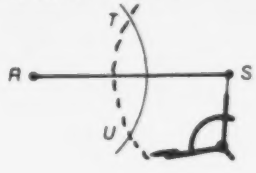
Angle OMN is congruent to angle ABC. $\angle OMN \cong \angle ABC$.

Bisecting Segments and Angles

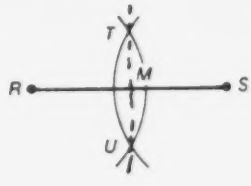
You can use a compass and a straightedge to **bisect** a segment. To bisect means to divide into two congruent parts. This construction also locates the middle point, or **midpoint,** of the segment.

Step 1
Open the compass to more than half the distance from R to S. Place the compass point on R. Draw an arc as shown.

Step 2
Keep the same compass opening. Place the compass point on S. Draw an arc as shown. Label the points of intersection T and U.



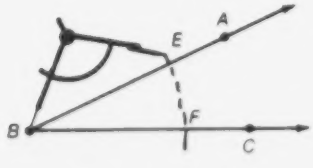
Step 3
Draw $\overline{TU}$. Label M, the point of intersection of $\overline{TU}$ and $\overline{RS}$.



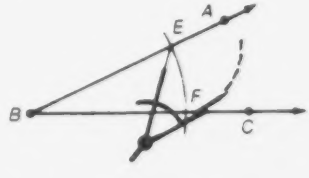
$\overleftrightarrow{TU}$ bisects $\overline{RS}$. $\overline{RM} \cong \overline{MS}$. M is the midpoint of $\overline{RS}$.

You can also use a compass and a straightedge to bisect an angle.

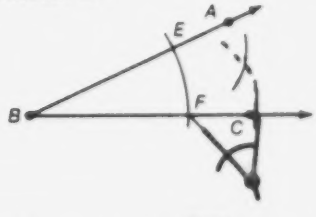
Step 1
Draw an arc through $\angle ABC$, intersecting its sides at two points, E and F.



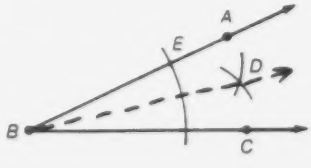
Step 2
Place the compass point on E and draw an arc as shown.



Step 3
Using the same compass opening, place the point on F and draw an arc that intersects the arc drawn in Step 2. Label the point of intersection D.



Step 4
Draw $\overline{BD}$ as shown.



$\angle ABD \cong \angle DBC$. $\overleftrightarrow{BD}$ is an **angle bisector.**

name

RETEACHING

WORKSHEET **111**

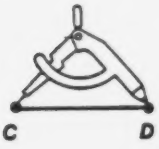
Constructing Congruent Segments and Angles

Congruent means equal in measure.

Construct a line segment congruent to $\overline{CD}$.

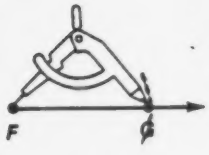
Step 1 $\overline{CD}$ is given.

Step 2 Open compass to the length of $\overline{CD}$.



Step 3 Draw a ray from *F*.

Step 4 Use the same compass opening to mark *G*.

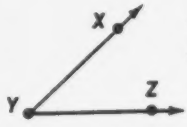


Step 5 $\overline{FG}$ is congruent to $\overline{CD}$.

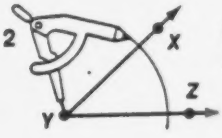
$\overline{FG} \cong \overline{CD}$

Construct an angle congruent to $\angle XYZ$.

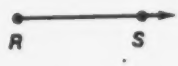
Step 1 $\angle XYZ$ is given.



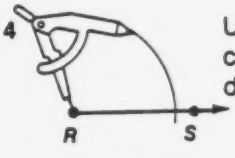
Step 2 Draw an arc through $\angle XYZ$.



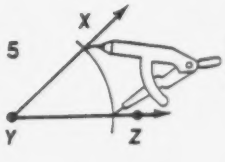
Step 3 Draw a ray from *R*.



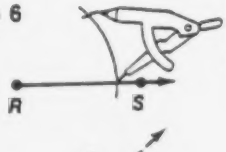
Step 4 Use the same compass opening to draw an arc.



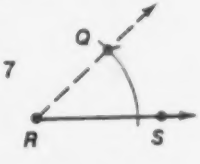
Step 5 Measure the angle with the compass.



Step 6 Use the same compass opening to locate point *Q*.



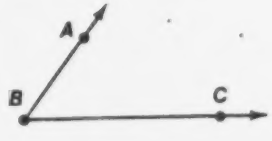
Step 7 Draw $\overrightarrow{RQ}$.



$\angle QRS \cong \angle XYZ$

1. Draw a line segment congruent to $\overline{LM}$.

2. Draw an angle congruent to $\angle ABC$.



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RETEACHING

WORKSHEET **112**

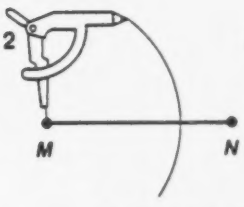
Bisecting Segments and Angles

To **bisect** means to divide into two congruent parts.

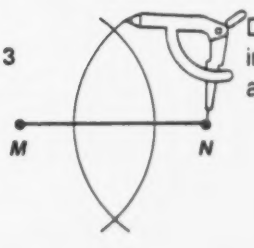
Bisect line segment *MN*.

Step 1 $\overline{MN}$ is given.

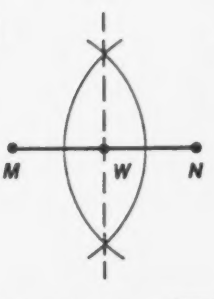
Step 2 Draw an arc.



Step 3 Draw a second intersecting arc.



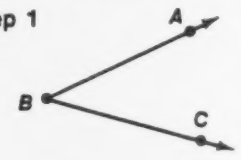
Step 4 Draw the bisecting line. Mark point *W*.



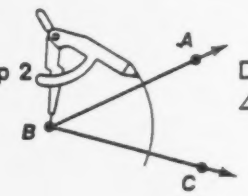
W is the midpoint of $\overline{MN}$.

Bisect angle *ABC*.

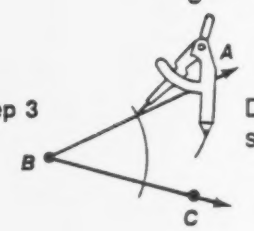
Step 1 Draw ∠*ABC*.



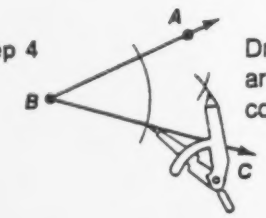
Step 2 Draw an arc through ∠*ABC*.



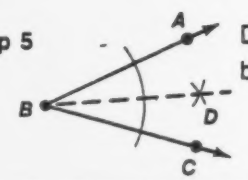
Step 3 Draw an arc as shown.



Step 4 Draw an intersecting arc using the same compass opening.

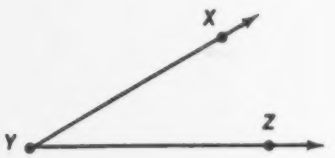


Step 5 Draw the angle bisector, $\overrightarrow{BD}$.



1. Bisect line segment $\overline{KL}$.

2. Bisect angle *XYZ*.



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LESSON 5

CONSTRUCTING CONGRUENT SEGMENTS AND ANGLES

BISECTING SEGMENTS AND ANGLES

You measure the length of line segments with rulers. LOGO uses a turtle step as the unit of measure for length. How long is a turtle step?

1. Teach the turtle to draw a line segment.

```
TYPE:  TO LINE :LENGTH
       HT RT 90
       FD :LENGTH BK :LENGTH
TYPE:  CTRL C
```

a. How many turtle steps is the segment in LINE 50 ?

_____

b. How many centimeters is the segment in LINE 50 ? _____

c. How many centimeters long is LINE 100 segment? _____

d. How many centimeters long is LINE 40 segment? _____

Create the two procedures below for the constructions described.

```
TYPE:  TO LINE.1 :LENGTH
       FD :LENGTH  BK :LENGTH
       HT
TYPE:  CTRL C
```

LESSON 5 - BISECTING SEGMENTS & ANGLES

```
TYPE:  TO DASH :TIMES
       REPEAT :TIMES [FD 5 PU FD 5 PD]
       PU BACK (10 * :TIMES) PD
TYPE:  CTRL C
```

Let's do one problem together.

PROBLEM: Construct a line segment with a length given by input. Use dashed line segments to divide that segment into two equal pieces.

```
TYPE:  TO DIVIDE2 :LENGTH :TIMES
       LINE.1 :LENGTH PU FD :LENGTH/2
       LT 90 BK :TIMES*5
       PD PC 4
       DASH :TIMES PC 1
TYPE:  CTRL C
```

Let's see if it works.

TYPE: DRAW DIVIDE2 100 10 MAKE A SKETCH

TYPE: DRAW DIVIDE2 50 10 MAKE A SKETCH

TYPE: DRAW DIVIDE2 37 10 MAKE A SKETCH

LESSON 5 - BISECTING SEGMENTS & ANGLES

NOW TYPE: READ "DIVIDE4

TYPE: READ "DIVIDE5

TYPE: READ "DIVIDE7

1. Construct a line segment with length given by input. Use dashed line to divide that segments into four equal pieces.

TYPE: DRAW DIVIDE4 100 10 MAKE A SKETCH

2. Construct a line segment with length given by input. Use dashed line to divide that segment into five equal pieces.

TYPE: DRAW DIVIDE5 90 10 MAKE A SKETCH

3. Construct a line segment with length given by input. Use dashed line to divide that segment into seven equal pieces.

TYPE: DRAW DIVIDE7 126 10 MAKE A SKETCH

LESSON 5 - BISECTING SEGMENTS & ANGLES

Below are some solutions to some angle-splitting problems. Teach the turtle the procedures. Draw or describe what the turtle does.

First, teach the turtle the following procedures.

```
TYPE:  READ "ARROWS

TYPE:  TO LINE.2 :LENGTH
         FD :LENGTH ARROW  BK :LENGTH

TYPE: TO DASH.2 :TIMES
        REPEAT :TIMES [FD 5 PU FD 5 PD]
        PU BACK (10 * :TIMES) PD
```

1. TO PROBLEM.1 DESCRIPTION/SKETCH

```
LINE.2 100 RT 70
LINE.2 100
LT 35 PC 5
DASH.2 10 PC 1
```

2. TO PROBLEM.2 DESCRIPTION/SKETCH

```
LINE.2 110 LT 120
LINE.2 110
RT 60 PC 2 DASH.2 11
PC 1
```

LESSON 5 - BISECTING SEGMENTS & ANGLES

```
3. TO PROBLEM.3                                    DESCRIPTION/SKETCH
   LINE.2 90 RT 90
   LINE.2 90
   REPEAT 2 [LT 30 PC 3 DASH.2 9]
   PC 1

4. TO PROBLEM.4                                    DESCRIPTION/SKETCH
   LINE.2 120 LT 85 LINE.2 120
   RT (85/2) PC 4 DASH.2 12
   PC 1

5. TO PROBLEM.5 :ANGLE                               DESCRIPTION
   LINE.2 120 RT :ANGLE
   LINE.2 120
   LT (:ANGLE/2) PC 5
   DASH.2 12 PC 1
```

Now try these:

```
     TYPE: DRAW PROBLEM.5 150
     TYPE: DRAW PROBLEM.5 90
```

```
6. TO PROBLEM.6 :ANGLE :SPLIT                            DESCRIPTION
   LINE.2 110 LT :ANGLE
   LINE.2 110
   REPEAT :SPLIT - 1 [RT (:ANGLE/:SPLIT) PC 2 DASH.2 11].
   PC 1
```

LESSON 5 - BISECTING SEGMENTS & ANGLES

Now try these:

TYPE: DRAW PROBLEM.6 130 4

TYPE: DRAW PROBLEM.6 90 9

Remember: When done, save as LESSON.5

name

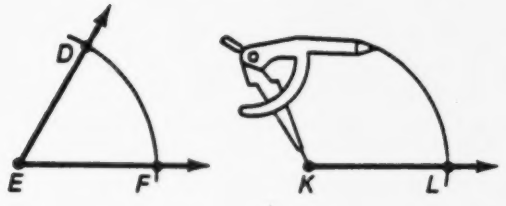
PRACTICE

WORKSHEET **111**

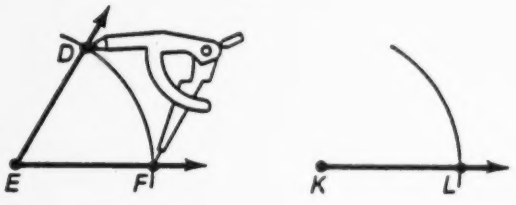
Constructing Congruent Line Segments and Angles

Construct an angle congruent to *DEF*

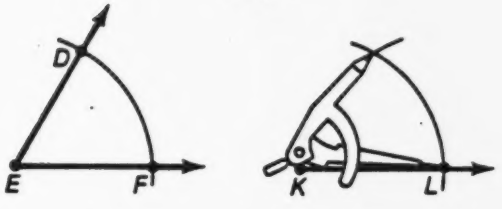
Step 1



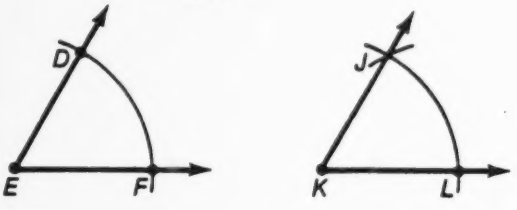
Step 2



Step 3



Step 4



Practice • Construct a congruent figure.

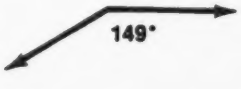
1.

2.

3.

4.

5.

6. 

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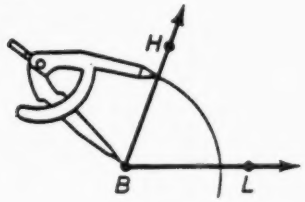
PRACTICE

WORKSHEET **112**

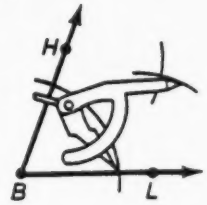
Bisecting Line Segments and Angles

You can use a compass and a straightedge to **bisect** an angle.

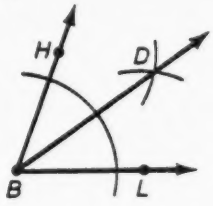
Step 1



Step 2



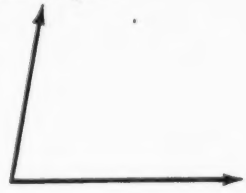
Step 3



Practice • Use a compass and a straightedge to bisect each figure.

1.

2.



3.

4.

5.

6.

7.

8.

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LESSON 6

ANGLE RELATIONSHIPS

CHECKLIST OF ACTIVITIES

_____1. READ: PAGE 51

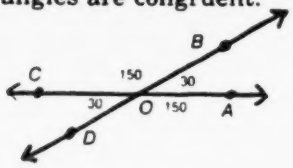
_____2. WRITE: PAGE 52

_____3. DO COMPUTER ACTIVITY: PAGES 53-58

_____4. WRITE: PAGE 59

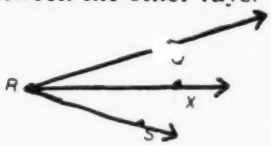
Angle Relationships

If two lines intersect, two pairs of **vertical angles** are formed. Vertical angles are congruent.

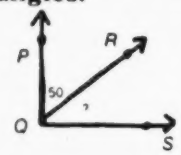


$m\angle AOB = m\angle COD$
$m\angle COB = m\angle AOD$

Angles QRX and XRS are **adjacent angles.** Adjacent angles have a common vertex and a common ray between the other rays.



If the sum of the measures of two angles is 90°, they are **complementary angles.**



Angle PQS is a right angle. So angles PQR and RQS are complementary.

The measure of $\angle PQR$ is 50°.
Find the measure of $\angle RQS$.

$$50 + n = 90$$
$$n = 40$$

The measure of $\angle RQS$ is 40°.

Which pair of angles is complementary? Which pair is supplementary?

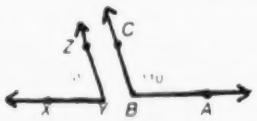
If the sum of the measures of two angles is 180°, they are **supplementary angles.**

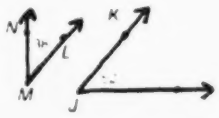
Angle EFH is a **straight angle:** it has a measure of 180°. So angles EFG and GFH are supplementary.

The measure of $\angle EFG$ is 70°.
Find the measure of $\angle GFH$.

$$70 + n = 180$$
$$n = 110$$

The measure of $\angle GFH$ is 110°.



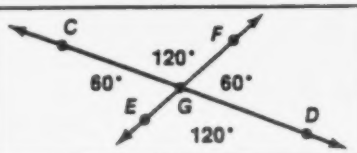
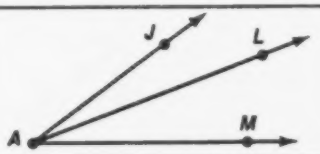
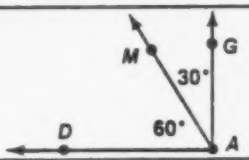
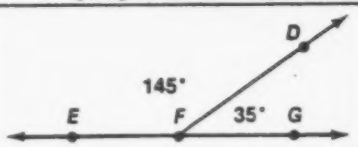


name

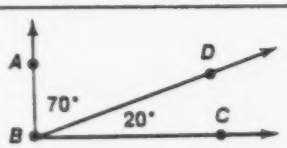
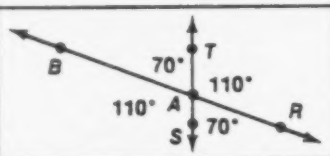
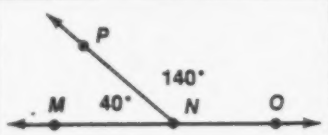
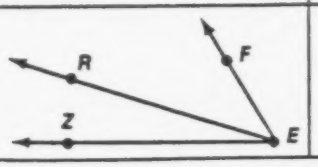
RETEACHING

WORKSHEET **113**

Angle Relationships

Name	Picture	Think:
Vertical Angles		$m\angle EGD = m\angle CGF$ $m\angle CGE = m\angle FGD$
Adjacent Angles		$\angle JAL$ is adjacent to $\angle LAM$.
Complementary Angles		$m\angle GAM + m\angle MAD = 90°$ $m\angle GAD = 90°$
Supplementary Angles		$m\angle GFD + m\angle DFE = 180°$ $m\angle EFG = 180°$

Complete.

	Name	Picture	Think:
1.	_____ Angles		m∠_____ + m∠_____ = _____ m∠_____ = _____
2.	_____ Angles		m∠_____ = m∠_____ m∠_____ = m∠_____
3.	_____ Angles		m∠_____ + m∠_____ = _____ m∠_____ = _____
4.	_____ Angles		∠_____ is _____ to ∠_____

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LESSON 6

ANGLE RELATIONSHIPS:
COMPLEMENTARY, SUPPLEMENTARY
ADJACENT, AND VERTICAL

TYPE: READ "COMPLEMENT

TYPE: DRAW

TYPE: ANGLE 50

How many degrees would have to be added to a 50 degree angle to get a total number of degrees of 90 ? _____

TYPE: ANGLE # HT (# is your answer to the question)

Notice the screen. You get two smaller adjacent (next to each other) angles inside one larger angle which measures exactly 90. The 40 degree angle and the 50 degree angle are said to be complementary angles because their sum is exactly 90 degrees. You could also say that they are complements of each other.

TRY THESE: In each problem below, find the complement of the given angle. That is, the angle needed to make a sum of 90 degrees. Use the turtle to check your results.

1. DRAW ANGLE 5 ANGLE # HT ?

2. DRAW ANGLE 87 ANGLE # HT ?

3. DRAW ANGLE 46 ANGLE # HT ?

4. DRAW ANGLE 90 ANGLE # HT ?

5. DRAW ANGLE 24 ANGLE # HT ?

6. DRAW ANGLE 36 ANGLE # HT ?

7. DRAW ANGLE 75 ANGLE # HT ?

8. DRAW ANGLE 10 ANGLE # HT ?

9. DRAW ANGLE 69 ANGLE # HT ?

10. DRAW ANGLE 45 ANGLE # HT ?

TYPE: READ "SUPPLEMENT

TYPE: DRAW

TYPE: LT 90 ANGLE 70

How many degrees would have to be added to a 70 degree angle to get a total of 180 degrees ? _____

TYPE: ANGLE # HT (You enter number)

Notice the screen. You get two smaller adjacent angles inside one large angle which is a straight angle of exactly 180 degrees. The two angles of 110 degrees and 70 degrees are supplements of each other. The pair of angles are supplementary since their sum is exactly 180 degrees.

LESSON 6 - ANGLE RELATIONSHIPS

TRY THESE: In each problem, find the supplement of the given angle. The angle needed to make a total of 180. Use the computer to check your answers.

1. TYPE: DRAW LT 90 ANGLE 5 ANGLE # HT ?

2. TYPE: DRAW LT 90 ANGLE 78 ANGLE # HT ?

3. TYPE: DRAW LT 90 ANGLE 146 ANGLE # HT ?

4. TYPE: DRAW LT 90 ANGLE 90 ANGLE # HT ?

5. TYPE: DRAW LT 90 ANGLE 42 ANGLE # HT ?

6. TYPE: DRAW LT 90 ANGLE 106 ANGLE # HT ?

7. TYPE: DRAW LT 90 ANGLE 110 ANGLE # HT ?

8. TYPE: DRAW LT 90 ANGLE 75 ANGLE # HT ?

9. TYPE: DRAW LT 90 ANGLE 100 ANGLE # HT ?

10. TYPE: DRAW LT 90 ANGLE 45 ANGLE # HT ?

LESSON 6 - ANGLE RELATIONSHIPS

TYPE: READ *LETTERS

TYPE: READ *ARROWS

TYPE: READ *VERTICAL

TYPE: DRAW

TYPE: INTERSECT.1 200 20

Look at the screen to answer the following questions.

1. How many angles are formed when 2 lines intersect ?
_____

2. Do any pairs of angles seem to be the same size ? (use protractor if you are not sure) _____

3. The pairs that are the same size are:

Angles ___ and ___

Angles ___ and ___

DEFINITION: When two lines intersect, there are two pairs of equal angles. These pairs of equal angles are called VERTICAL angles. The ADJACENT pairs (next to each other) always are SUPPLEMENTARY.

4. Which pairs are supplementary ?

Angles ___ and ___

Angles ___ and ___

Angles ___ and ___

Angles ___ and ___

LESSON 6 - ANGLE RELATIONSHIPS

Which pairs of angles are adjacent?

Angles ___ and ___

Angles ___ and ___

Angles ___ and ___

Angles ___ and ___

TRY THESE: Make a sketch for each of the following. Label each angle. Write the vertical angles and the supplementary angles.

5. TYPE: DRAW INTERSECT.1 220 30 SKETCH

VERTICAL ANGLES ___ & ___

___ & ___

SUPPLEMENTARY ANGLES ___ & ___

___ & ___

6. TYPE: DRAW INTERSECT.2 230 40 SKETCH

VERTICAL ANGLES ___ & ___

___ & ___

SUPPLEMENTARY ANGLES ___ & ___

___ & ___

LESSON 6 - ANGLE RELATIONSHIPS

7. TYPE: DRAW INTERSECT.2 100 60 SKETCH

VERTICAL ANGLES ___ & ___

___ & ___

SUPPLEMENTARY ANGLES ___ & ___

___ & ___

8. TYPE: DRAW INTERSECT.3 200 80 SKETCH

VERTICAL ANGLES ___ & ___

___ & ___

SUPPLEMENTARY ANGLES ___ & ___

___ & ___

9. TYPE: DRAW INTERSECT.3 220 90 SKETCH

VERTICAL ANGLES ___ & ___

___ & ___

SUPPLEMENTARY ANGLES ___ & ___

___ & ___

DO THIS: Write a procedure where you input an angle between 0 and 90 degrees and the turtle draws that angle and either its complement or supplement.

name _____

PRACTICE

WORKSHEET **113**

Angle Relationships

If the sum of the measures of two angles is 90°, they are **complementary angles.**

If the sum of the measures of two angles is 180°, they are **supplementary angles.**

Practice • Use the drawing to do exercises 1 through 4.

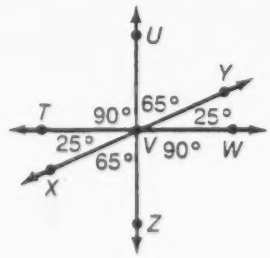
1. Name one pair of vertical angles. _____ _____
2. Name one pair of adjacent angles. _____ _____
3. Are angles *DEF* and *JEL* complementary? _____
4. Are angles *DEF* and *JEL* supplementary? _____

Find the measure of an angle that is

5. complementary to 48°. _____
6. supplementary to 89°. _____

Mixed Practice • Use the drawing to do exercises 7 through 12.

7. Name two pairs of vertical angles. _____
8. Name two pairs of adjacent angles. _____
9. Are angles *UVY* and *YVW* complementary? _____
10. Are angles *UVX* and *UVY* supplementary? _____
11. Are angles *TVX* and *XVZ* complementary? _____
12. Are angles *YVW* and *WVZ* supplementary? _____



The angles are complementary. Find the missing measures.

13. 53°, *x* _____
14. 12°, *y* _____
15. 68°, *n* _____
16. 88°, *y* _____
17. 76°, *n* _____
18. 35°, *x* _____
19. 24°, *n* _____
20. *x*, 41° _____
21. *y*, 59° _____

The angles are supplementary. Find the missing measures.

22. 111°, *y* _____
23. 45°, *x* _____
24. 168°, *n* _____
25. 74°, *x* _____
26. 177°, *n* _____
27. 132°, *y* _____
28. *n*, 102° _____
29. 55°, *y* _____
30. *n*, 37° _____
31. 28°, *n* _____
32. *x*, 79° _____
33. 112°, *y* _____

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Use with text pages 314–315.

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LESSON 7

PERPENDICULAR AND PARALLEL

CHECKLIST OF ACTIVITIES

_____1. READ: PAGE 61

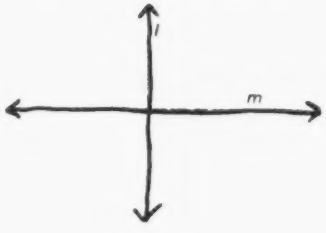
_____2. WRITE: PAGE 62

_____3. DO COMPUTER ACTIVITY: PAGES 63-70

_____4. WRITE: PAGE 71

Perpendicular and Parallel Lines

Two lines that intersect to form right angles are **perpendicular lines.** The drawing shows perpendicular lines, named with the small letters l and m.



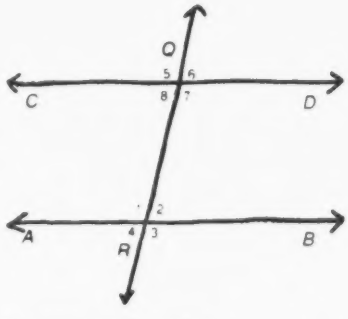
Write: $l \perp m$.

Read: line l is perpendicular to line m.

How many right angles are formed by l and m?

Lines that are in the same plane and never intersect are **parallel lines.**

This drawing shows parallel lines, $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$.



Write: $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$.

Read: Line AB is parallel to line CD.

$\overleftrightarrow{QR}$ intersects both $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$.
$\overleftrightarrow{QR}$ is a **transversal.**

When a pair of parallel lines are intersected by a transversal, pairs of congruent **corresponding angles** are formed.

$\angle 1$ and $\angle 5$ extend above $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ and to the left of the transversal. They are in corresponding positions.

$\angle 1$ and $\angle 5$ are corresponding angles.

$\angle 1 \cong \angle 5$

$\angle 4$ and $\angle 8$ are corresponding angles.
$\angle 4 \cong \angle 8$

There are two other pairs of corresponding angles.

$\angle 2$ and $\angle 6$
$\angle 2 \cong \angle 6$

$\angle 3$ and $\angle 7$
$\angle 3 \cong \angle 7$

name

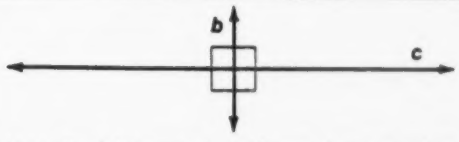
RETEACHING

WORKSHEET **114**

Perpendicular and Parallel Lines

Complete.

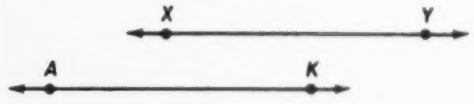
1. **Perpendicular Lines**



Lines that intersect to form right angles are perpendicular lines.

Write: _____ ⊥ _____

2. **Parallel Lines**

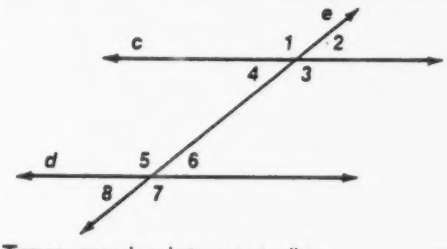


Parallel lines are always the same distance apart.

_____ ∥ _____

You can use a number to name an angle.

3. **Transversal**



Think: There are pairs of corresponding angles.

∠ 1 ≅ ∠ 5

∠ 2 ≅ ∠ 6

∠ 3 ≅ ∠ _____

∠ 4 ≅ ∠ _____

Transversal *e* intersects line _____ and line _____.

Write *parallel, intersecting,* or *perpendicular.*

4.

_____

5.

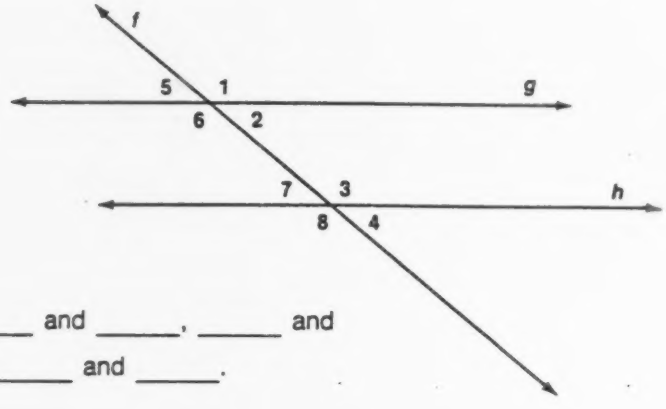
_____

6.

_____

Complete.

7. *g* is parallel to _____.
8. _____ intersects *g* and *h*.
9. ∠ 1 ≅ ∠ _____
10. ∠ 2 ≅ ∠ _____
11. ∠ 6 ≅ ∠ _____
12. ∠ 5 ≅ ∠ _____
13. The corresponding angles are: _____ and _____, _____ and _____, _____ and _____, and _____ and _____.



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Use with text pages 316–317.

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LESSON 7

INTERSECTING LINE SEGMENTS: PARALLEL, PERPENDICULAR, ANGLE RELATIONSHIPS

Line segments A and B
INTERSECT
at a point.

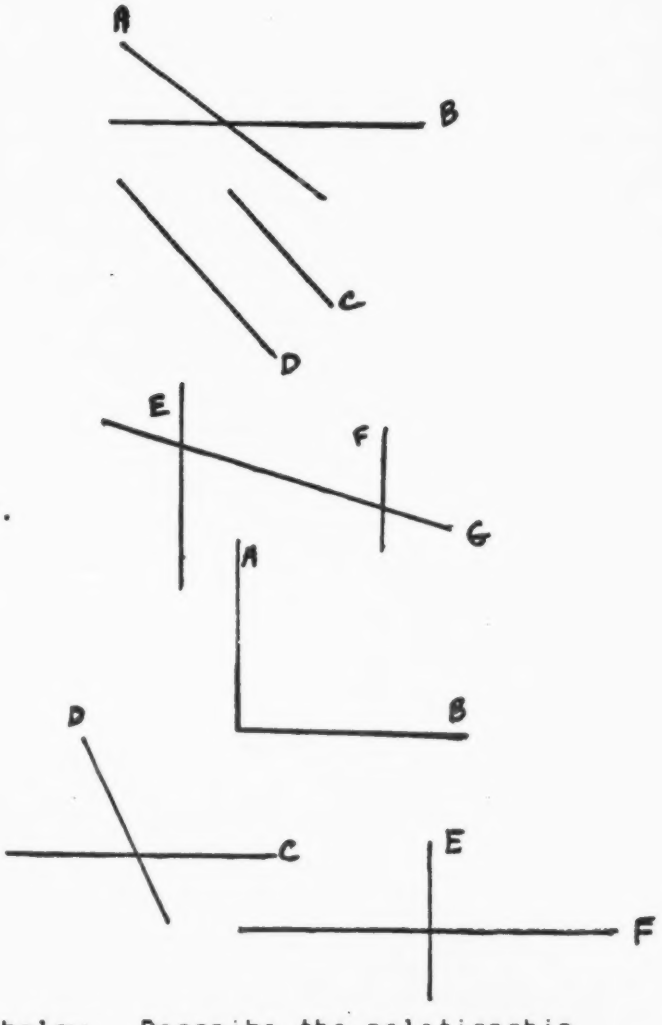
Line segments C and D are
PARALLEL
and do not intersect.

Line segments E and F are
PARALLEL.
Line segment G
INTERSECTS
both line segments E and F.

Line segments A and B are
PERPENDICULAR.

Line segment D is a
BISECTOR
of line segment C,

Line segment E is a
PERPENDICULAR BISECTOR
of line segment F.



Type in each construction below. Describe the relationship between the line segments, using one of the following choices: PARALLEL, INTERSECTING, PERPENDICULAR, BISECTOR, or PERPENDICULAR BISECTOR.

LESSON 7 - INTERSECTING LINE SEGMENTS

Type in each construction below. Describe the relationship between the line segments, using one of the following choices: PARALLEL, INTERSECTING, PERPENDICULAR, BISECTOR, or PERPENDICULAR BISECTOR.

First, teach the turtle the procedure LINE.

```
TO LINE :LENGTH
FD :LENGTH BK :LENGTH
```

1.
```
TO CONSTRUCT.1
HT LINE 100
PU RT 135 BK 20 LT 90
PD LINE 120
```
SKETCH/DESCRIPTION

2.
```
TO CONSTRUCT.2
HT LINE 40 PU RT 90
FD 50 LT 90 PD
LINE 70
```
SKETCH/DESCRIPTION

3.
```
TO CONSTRUCT.3
HT LT 70 LINE 75
PU LT 20 FD 80
RT 135 PD LINE 200
```
SKETCH/DESCRIPTION

4.
```
TO CONSTRUCT.4
HT LINE 100 PU RT 90
FD 60 LT 90 PD
LINE 100 PU RT 90
FD 20 LT 140 PD
LINE 150
```
SKETCH/DESCRIPTION

LESSON 7 - INTERSECTING LINE SEGMENTS

```
5. TO CONSTRUCT.ONE                    SKETCH/DESCRIPTION
   HT LINE 100 FD 30
   RT 90 LINE 70 LT 90
   BK 30

6. TO CONSTRUCT.TWO                    SKETCH/DESCRIPTION
   HT LINE 100 PU FD 50
   RT 45 BK 20 PD
   LINE 40 PU FD 20
   LT 45 BK 50 PD

7. TO CONSTRUCT.THREE                  SKETCH/DESCRIPTION
   HT LINE 50 RT 90
   LINE 75 LT 90

8. TO CONSTRUCT.FOUR                   SKETCH/DESCRIPTION
   HT RT 90 LINE 100
   FD 50 LT 90 LINE 75

9. TO CONSTRUCT.FIVE                   SKETCH/DESCRIPTION
   HT LINE 100 PU FD 40
   LT 90 BK 20 PD LINE 40
   PU FD 20 RT 90 BK 40
   PD
```

LESSON 7 - INTERSECTING LINE SEGMENTS

10. TO CONSTRUCT.SIX

```
HT LT 90 LINE 100 PU
FD 40 RT 100 BK 60 PD
LINE 120 PU FD 60
LT 100 BK 40 PD RT 90
```

SKETCH/DESCRIPTION

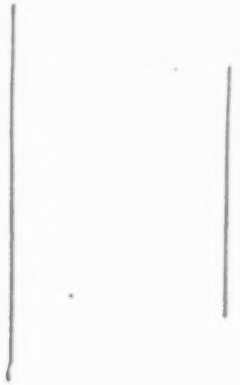
Create procedures for the constructions below. The pictures are examples of the many possible solutions. The diagrams are not drawn to scale.

11. Construct a line segment 40 turtle steps in length that intersects a line segment of 70 turtle steps in length.

TO INTERSECT

12. Construct a line segment 100 turtle steps in length that is parallel to a line segment 80 turtle steps in length.

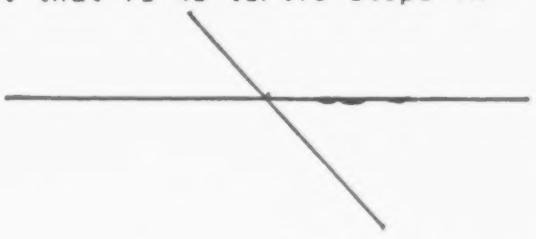
TO PARALLEL



LESSON 7 - INTERSECTING LINE SEGMENTS

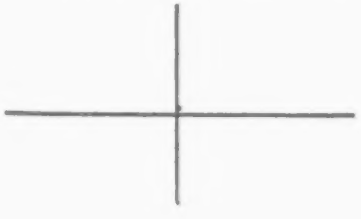
13. Construct a line segment 120 turtle steps in length that is bisected by another line segment that is 45 turtle steps in length.

TO BISECT



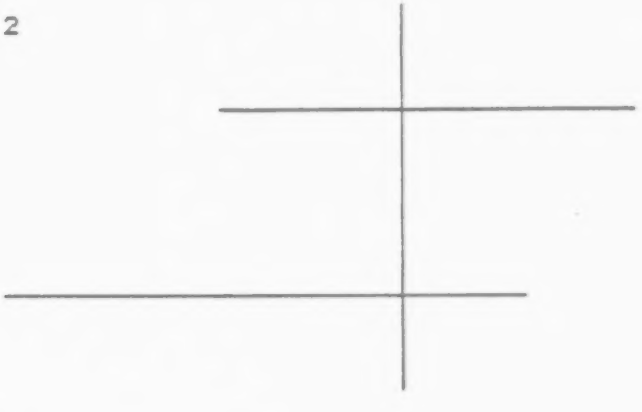
14. Construct a line segment that is 7[illegible] turtle steps in length that is the perpendicular bisector of a line segment that is 120 turtle steps in length.

TO PERPEND



15. Construct two line segments which are parallel and a third line segment that intersects and is perpendicular to both parallel line segments.

TO PARALLEL.2



LESSON 7 - INTERSECTING LINE SEGMENTS

TYPE: READ "LETTERS

TYPE: READ "ARROWS

TYPE: READ "PARALLEL

TYPE: DRAW

TYPE: TRANSVERSAL 45

Notice the screen.

1. How many angles are formed when two parallel lines are intersected by a third line called a transversal ? _____

2. Do any pairs of angles seem to be the same size ? (use protractor if you are not sure) _____

3. Name the equal pairs of angles.

___ & ___ ___ & ___ ___ & ___

___ & ___ ___ & ___ ___ & ___

___ & ___ ___ & ___

Since certain pairs of angles are equal in size, they are given particular names.

Angles A and T
Angles E and F
Angles C and I
Angles Z and L
} are called corresponding angles

Angles A and L
Angles C and F
} are called alternate exterior angles

LESSON 7 - INTERSECTING LINE SEGMENTS

Angles E and I
Angles T and Z
} are called alternate interior angles

Angles A and Z
Angles C and E
Angles T and L
Angles I and F
} are called vertical angles

TRY THESE: For each of the following, make a sketch, label the angles and name the pairs of corresponding, alternate interior, alternate exterior, and vertical angles.

1. TYPE: DRAW TRANS.1 60 SKETCH

corresponding ___ & ___ ___ & ___ ___ & ___ ___ & ___

alternate interior ___ & ___ ___ & ___

alternate exterior ___ & ___ ___ & ___

vertical ___ & ___ ___ & ___ ___ & ___ ___ & ___

LESSON 7 - INTERSECTING LINE SEGMENTS

2. TYPE: DRAW TRANS.1 40 SKETCH

corresponding ___ & ___ ___ & ___ ___ & ___ ___ & ___

alternate interior ___ & ___ ___ & ___

alternate exterior ___ & ___ ___ & ___

vertical ___ & ___ ___ & ___ ___ & ___ ___ & ___

3. TYPE: DRAW TRANS.1 170 SKETCH

corresponding ___ & ___ ___ & ___ ___ & ___ ___ & ___

alternate interior ___ & ___ ___ & ___

alternate exterior ___ & ___ ___ & ___

vertical ___ & ___ ___ & ___ ___ & ___ ___ & ___

4. TYPE: DRAW TRANS.1 0 SKETCH

corresponding ___ & ___ ___ & ___ ___ & ___ ___ & ___

alternate interior ___ & ___ ___ & ___

alternate exterior ___ & ___ ___ & ___

vertical ___ & ___ ___ & ___ ___ & ___ ___ & ___

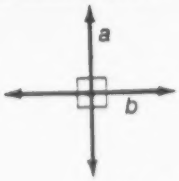
name

PRACTICE

WORKSHEET **114**

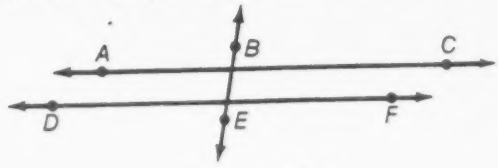
Perpendicular and Parallel Lines

Two lines that intersect to form right angles are **perpendicular lines.**



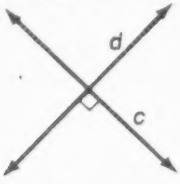
$a \perp b$

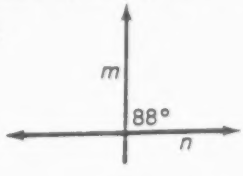
Lines that are in the same plane and never intersect are **parallel lines.**

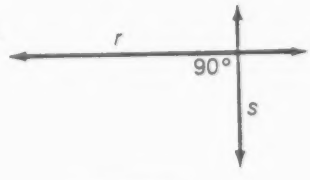


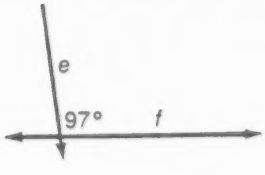
$\overleftrightarrow{AC} \parallel \overleftrightarrow{DF}$

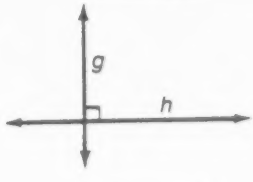
Practice • Are the lines perpendicular? Write *yes* or *no*.

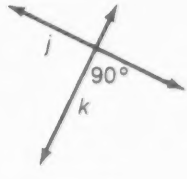
1. 

2. 

3. 

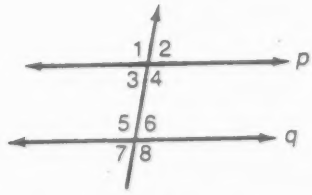
4. 

5. 

6. 

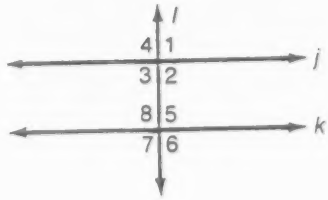
7. Lines p and q are parallel.

   Name four pairs of corresponding angles.



8. Lines j and k are parallel.

   Name four pairs of corresponding angles.



Use your protractor to find the measure of

9. $\angle 3$. _____ 10. $\angle 5$. _____

11. Is line l perpendicular to line j? _____

12. Is line l perpendicular to line k? _____

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Use with text pages 316–317.

Use with text pages 316–317.

LESSON 8

POLYGONS

CHECKLIST OF ACTIVITIES

_____1. READ: PAGE 73

_____2. WRITE: PAGE 74

_____3. DO COMPUTER ACTIVITY: PAGES 75-80

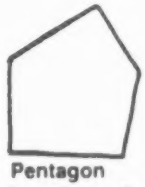
_____4. WRITE: PAGE 81

Polygons

A **polygon** has sides that are line segments. The sides meet to form angles. The vertices of the angles are also the vertices of the polygon. Names are given to polygons according to the number of sides and the number of angles they have.

Triangle
3 sides, 3 angles

Quadrilateral
4 sides, 4 angles



Pentagon
5 sides, 5 angles

Hexagon
6 sides, 6 angles

Heptagon
7 sides, 7 angles

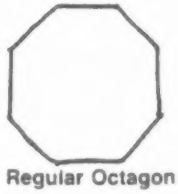
Octagon
8 sides, 8 angles

Nonagon
9 sides, 9 angles

Decagon
10 sides, 10 angles

A **regular polygon** has all its sides congruent and all its angles congruent.

Regular Pentagon



Regular Octagon

name

RETEACHING

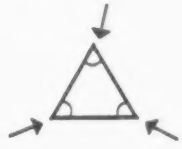
WORKSHEET 115

Polygons

Polygons have sides that are line segments.

Triangle

There are 3 sides.



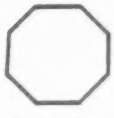
There are 3 angles.

Complete the table.

	Plane Figure	Name of Polygon	Number of Sides	Number of Angles
1.				
2.				
3.				
4.				
5.				
6.				
7.				

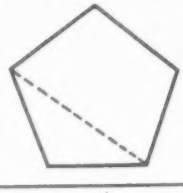
8. A **regular** polygon has all its sides congruent and all its angles congruent. Complete to name the polygons.

Regular



Regular

9. A **diagonal** is a line segment that joins the vertices of a polygon, but is not a side.
Complete to show 5 diagonals.



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LESSON 8

POLYGONS:
REGULAR, ANGLES, AND DIAGONALS

The turtle turns through angles to change direction. When the turtle draws a figure, his trip is measured by the sum of all the angles through which he turns.

Type in each of the following procedures. SKETCH the picture and tell how many degrees are in each turn and the total number of degrees through which the turtle turns.

1. TO TRI

SKETCH

```
REPEAT 3 [FD 30 RT 120]
HT
```

degrees in each turn _____

total number of degrees _____

2. TO SQUARE

```
REPEAT 4 [FD 80 LT 90]
HT
```

degrees in each turn _____

total number of degrees _____

LESSON 8 - POLYGONS

3. TO RHOMBUS SKETCH

```
FD 90 RT 120
FD 90 RT 60
FD 90 RT 120
FD 90 RT 120
HT
```

degrees in each turn _____

total number of degrees _____

4. TO TRAPEZOID

```
REPEAT 2 [FD 60 RT 60]
FD 60 RT 120
FD 121
HT
```

degrees in each turn _____

total number of degrees _____

From the four procedures above, what is the total number of degrees that the turtle turned to complete each figure ?

_____

Can you write procedures for the other REGULAR POLYGONS (all sides and all angles are equal) by changing the number of repeats and the input for RT?

Fill in the following blanks.

1. TO PENTAGON

REPEAT ___[FD 40 RT ___]

LESSON 8 - POLYGONS

2. TO HEXAGON

   REPEAT ___[FD 40 RT ___]

3. TO OCTAGON

   REPEAT ___[FD 40 RT ___]

4. TO DECAGON

   REPEAT ___[FD 40 RT ___]

5. Do you see a pattern? _____

6. What is the relationship between the number of sides and the number of REPEATS? _____

7. Can you find a relationship between the RT input and the number of REPEATS? _____

Hint: Take a look at new procedure for triangle.

```
TO TRIANGLE
REPEAT 3 [FD 40 RT 360/3]
HT
```

8. Can the inputs for RT in the other polygons be rewritten has 360 divided by the number of sides? _____

9. Write a procedure for a regular polygon with 9 sides?

LESSON 8 - POLYGONS

10. Write a procedure for a regular polygon with 12 sides?

11. Write a procedure for a regular polygon with 15 sides ?

TYPE: READ *POLYGONS

TYPE: DRAW

TYPE: POLYGON # (# to be replaced with number of sides)

Practice with POLYGON #.

LESSON 8 - POLYGONS

Use POLYGON and your protractor to complete the table below.

NAME OF FIGURE	NUMBER OF SIDES	NUMBER OF ANGLES	SUM OF INTERIOR ANGLES
1. TRIANGLE			
2. SQUARE			
3. PENTAGON			
4. HEXAGON			
5. HEPTAGON			
6. OCTAGON			
7. NONAGON			
8. DECAGON			

DEFINITION: A diagonal is a line segment that joins the nonadjacent vertices of a polygon.

TYPE: READ "DIAGONALS

TYPE: DRAW

TYPE: POLYGON 4

1. What kind of polygon did you get? _____

LESSON 8 - POLYGONS

Now TYPE: RT 45 PC 2 FD 70

The green line segment is a diagonal of the square.

TYPE: BK 70 LT 45 FD 50 RT 135

PD FD 70 PC 1

You get a second diagonal.

2. Can you draw any more diagonals for a square ? _____

Complete the table below to find the number of diagonals for other polygons.

POLYGON	NUMBER OF SIDES	NUMBER OF DIAGONALS
3. Quadrilateral(from above)		
4. DRAW DIAGONAL.PENTAGON		
5. DRAW DIAGONAL.HEXAGON		
6. DRAW DIAGONAL.HEPTAGON		
7. DRAW DIAGONAL.OCTAGON		

Remember: Save as LESSON.8

name

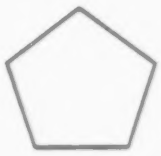
PRACTICE

WORKSHEET 115

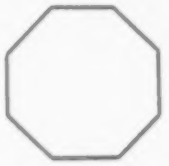
Polygons

Names are given to **polygons** according to the number of sides and the number of angles they have.

In a **regular polygon**, all of the sides are congruent and all of the angles are congruent.

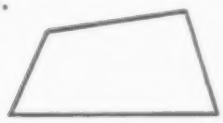


Regular Pentagon



Regular Octagon

Practice • Name the polygons.

1. 

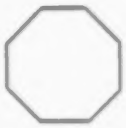
2.

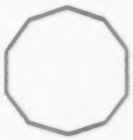
3.

4.

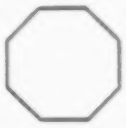
5.

6.

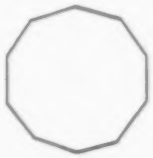
7. 

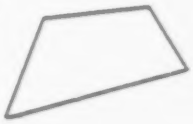
8. 

Is it a regular polygon? Write *yes* or *no*.
If *yes*, name the polygon.

9. 

10.

11. 

12. 

13.

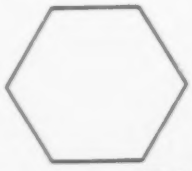
14.

15.

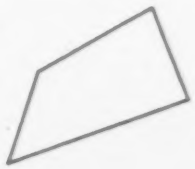
16.

Draw the diagonals of each polygon.

17.

18. 

19.

20. 

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LESSON 9

TRIANGLES

CHECKLIST OF ACTIVITIES

_____1. READ: PAGE 83

_____2. WRITE: PAGE 84

_____3. DO COMPUTER ACTIVITY: PAGES 85-90

_____4. WRITE: PAGE 91

Triangles

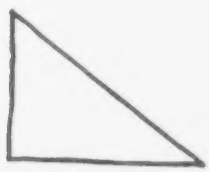
Triangles can be classified according to the lengths of their sides.

Equilateral Triangle
There are three congruent sides.

Isosceles Triangle
There are at least two congruent sides.

Scalene Triangle
There are no congruent sides.

Triangles can also be classified according to the measures of their angles.



Right Triangle
There is one right angle.

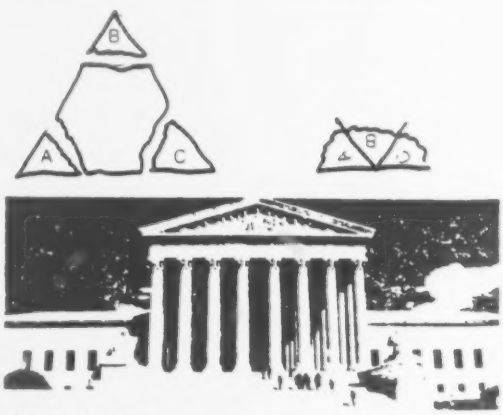
Acute Triangle
There are three acute angles.

Obtuse Triangle
There is one obtuse angle.

This drawing shows a triangle with the parts of the angles near the vertices cut away. Then the angles are fit together as shown.

The sides lie along a straight line. The sum of their measures is 180°.

Repeat the experiment with other triangles. Is the sum 180° each time?



The sum of the measures of the angles of a triangle is 180°.

If you know the measures of two angles of a triangle, you can find the measure of the other angle.

$$n + 85° + 72° = 180°$$
$$n + 157° = 180°$$
$$n + 157° - 157° = 180° - 157°$$
$$n = 23°$$

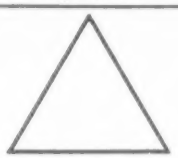
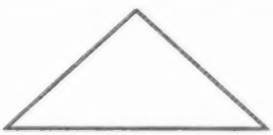
name

RETEACHING

WORKSHEET **116**

Triangles

Triangles can be classified according to the length of their sides.

Equilateral	Isosceles	Scalene
		
All 3 sides are of equal length.	At least 2 sides are of equal length.	Each side is a different length.

Measure the lengths of the sides. Name the type of triangle.

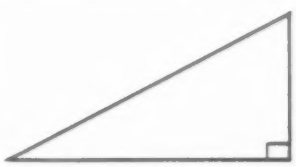
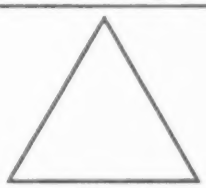
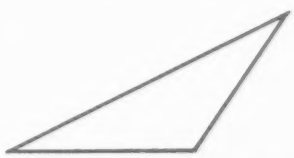
1.

2.

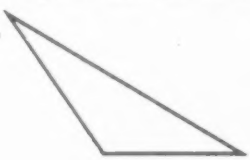
3.

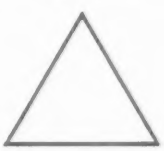
4.

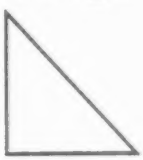
Triangles can also be classified according to the measures of their angles.

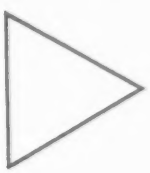
Right Triangle	Acute Triangle	Obtuse Triangle
		
There is one right angle.	There are 3 acute angles.	There is one obtuse angle.

Use a protractor to measure the angles. Name the type of triangle.

5. 

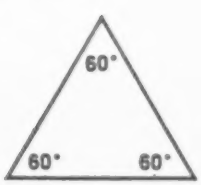
6. 

7. 

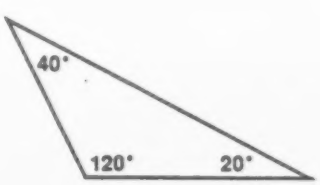
8. 

The sum of the measures of the angles of a triangle is 180°.

Complete.

9. 

____°
+ ____°
+ ____°
= 180°

10. 

____°
+ ____°
+ ____°
= 180°

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Use with text pages 320–321.

LESSON 9

TRIANGLES CLASSIFIED BY SIDES
AND BY ANGLES

The triangle contains three sides and three angles (smallest number of sides and angles that a polygon can contain).

One way to distinguish between kinds of triangles is to look at the LENGTH of the three sides.

1. Write a procedure to draw an equilateral triangle where the length of the equal sides can be inputted.

TO EQUILATERAL :SIDE

2. TYPE: DRAW EQUILATERAL 70

3. Measure the sides in centimeters.

Each side is _____ cm

4. What is the perimeter ? _____

5. Measure each angle.

Each angle measures ___ , ___,___

6. Are all the angles equal ? _____

7. What is the sum of the three angles ? _____

LESSON 9 - CLASSIFICATION OF TRIANGLES

Teach the turtle to make an isosceles triangle a new way by using SETXY. You will need a coordinate grid to see how it is planned.

```
TYPE:   TO ISOSCELES
        PU SETXY 0 100
        PD
        SETXY 30 (-30)
        SETXY -30 (-30)
        SETXY 0 100
        HT
TYPE: CTRL C

TYPE: DRAW ISOSCELES
```

8. Measure each side of the triangle.

   The sides measure ___,___,___

9. Make a sketch to show which sides are equal. _____

10. What is the perimeter ? _____

11. Measure all the angles using your protractor.

    The angles measure ___,___,___

12. Draw a sketch to show which two angles are equal.

13. What is the sum of the angles ? _____

LESSON 9 - CLASSIFICATION OF TRIANGLES

14. Write a procedure to draw a scalene triangle. Use SETXY and a grid to help you.

TO SCALENE

15. Measure each side of the triangle.

The sides measure ___,___,___

16. What is the perimeter ? _____

17. Measure all the angles.

The angles measure ___,___,___

18. What is the sum of the angles ? _____

---

1. Use SETXY and a grid to write a procedure to draw a right triangle.

TO RIGHT.TRI

2. Measure the two angles that are not right angles.

The three angles measure ___,___,___

LESSON 9 - CLASSIFICATION OF TRIANGLES

3. What is the sum of the two angles that are not right angles ? _____

4. Which side is the longest? Make a sketch to illustrate.

5. Is the longest side opposite the right angle ? _____

TYPE: READ *RIGHT.TRI.2

TYPE: DRAW RIGHT.TRI.2

6. Measure the two angles that are not right angles.

The three angles measure ___,___,___

7. What is the sum of the two non-right angles ? _____

8. Which is the longest side ? _____

Is it opposite the right angle ? _____

9. Can a right triangle be isosceles ? _____

Why? _____

10. Can a right triangle be equilateral ? _____

Why not ? _____

11. Can a right triangle have two right angles ? _____

LESSON 9 - CLASSIFICATION OF TRIANGLES

Teach the turtle to draw an obtuse triangle.

```
TYPE: TO OBTUSE
      PU SETXY -100 90 PD
      SETXY -50 0
      SETXY 100 0
      SETXY -100 90
      HT
```

12. Find the largest angle.

    Find the longest side.

    Are they opposite each other ? _____

    Make a sketch to illustrate.

13. Find the smallest angle.

    Find the smallest side.

    Are they opposite each other ? _____

    Make a sketch to illustrate.

14. Is it possible for an obtuse triangle to have more than I obtuse angle ? Why not?

_____

15. Write a procedure to draw an isosceles obtuse triangle.

```
TO OBTUSE.ISOS
```

LESSON 9 - CLASSIFICATION OF TRIANGLES

16. Write a procedure to draw an acute triangle.

    TO ACUTE

17. Is an equilateral triangle also an acute triangle ? _____

18. Can an isosceles triangle be an acute triangle ? _____

19. Can a scalene triangle be an acute triangle ? _____

Remember: Save as LESSON.9

name

PRACTICE

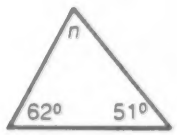
WORKSHEET **116**

Triangles

The sum of the measures of the angles of a triangle is 180°.

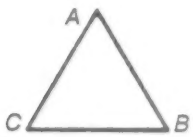
If you know the measures of two angles of a triangle, you can find the measure of the other angle.

$$n + 62° + 51° = 180°$$
$$n + 113° = 180°$$
$$n + 113° - 113° = 180° - 113°$$
$$n = 67°$$



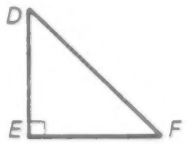
Practice • Measure the lengths of the sides. Then classify each triangle as *equilateral*, *isosceles*, or *scalene*. Some exercises have more than one answer.

1.



_____

2.



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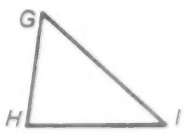
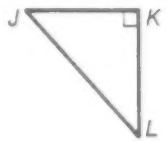
3.



_____

4.

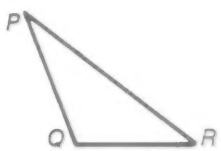


_____

5.

_____

6.



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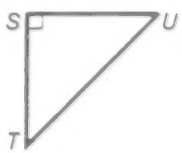
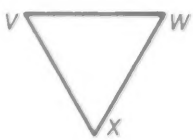
7.



_____

8.



_____

Use a protractor to measure the angles in exercises 1 through 8. Then classify each triangle as *right*, *acute*, or *obtuse*.

9. triangle *JKL* _____

10. triangle *PQR* _____

11. triangle *DEF* _____

12. triangle *ABC* _____

13. triangle *MNO* _____

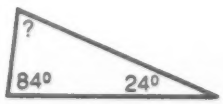
14. triangle *VXW* _____

15. triangle *RST* _____

16. triangle *GHI* _____

Without using a protractor find the measure of the third angle.

17.



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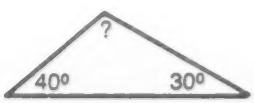
18.



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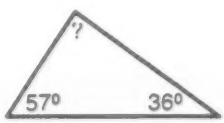
19.



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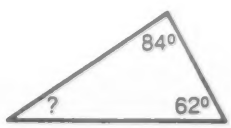
20.



_____

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LESSON 10

QUADRILATERALS

CHECKLIST OF ACTIVITIES

_____1. READ: PAGE 93

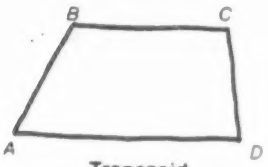
_____2. WRITE: PAGE 94

_____3. DO COMPUTER ACTIVITY: PAGES 95-98

_____4. WRITE: PAGE 99

Quadrilaterals

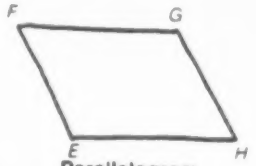
Some quadrilaterals have special names.



Trapezoid

Two and only two sides are parallel.

$\overline{AD} \parallel \overline{BC}$

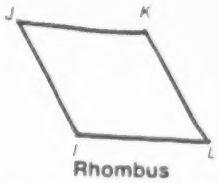


Parallelogram

Opposite sides are parallel and congruent.

$\overline{FE} \parallel \overline{GH}$ $\overline{FE} \cong \overline{GH}$

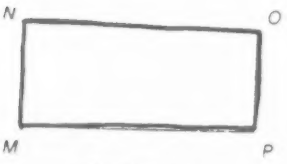
$\overline{FG} \parallel \overline{EH}$ $\overline{FG} \cong \overline{EH}$



Rhombus

A parallelogram that has four congruent sides.

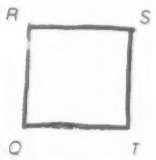
$\overline{IJ}$ $\overline{JK} \cong \overline{KL}$ $\overline{LI}$



Rectangle

A parallelogram that has four right angles.

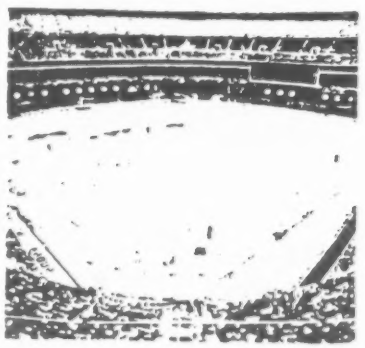
Angles M, N, O, and P are right angles.



Square

A rectangle that has four congruent sides.

$\overline{QR} \cong \overline{RS} \cong \overline{ST} \cong \overline{TQ}$

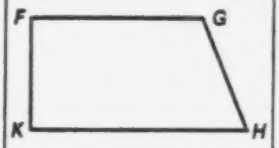
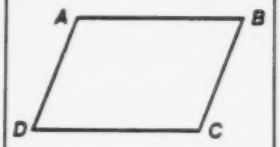
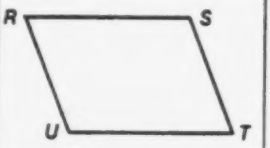
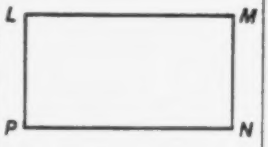
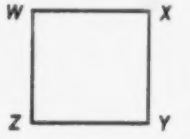


name

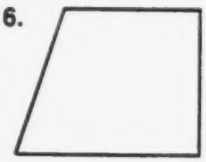
RETEACHING

WORKSHEET 117

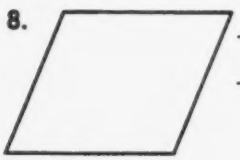
Quadrilaterals

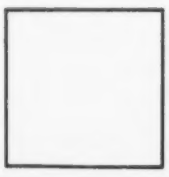
	Name	Figure	Description	Complete
1.	Trapezoid		Two and only two sides are parallel.	$\overline{FG} \parallel$ ↑ is parallel to
2.	Parallelogram		Opposite sides are parallel and congruent.	$\overline{AB} \parallel$ _____ $\overline{AD} \parallel$ _____ $\overline{AB} \cong$ _____ $\overline{BC} \cong$ _____ ↑ is congruent to
3.	Rhombus		A parallelogram with 4 congruent sides.	$\overline{RS} \cong$ _____ $\cong$ _____ $\cong$ _____
4.	Rectangle		A parallelogram that has 4 right angles.	$m\angle L =$ _____° $m\angle M =$ _____° $m\angle N =$ _____° $m\angle P =$ _____°
5.	Square		A rectangle that has 4 congruent sides.	$\overline{WX} \cong$ _____ $\cong$ _____ $\cong$ _____

Classify each quadrilateral as a *trapezoid*, *parallelogram*, *rhombus*, *rectangle*, or *square*. List each name that applies to the figure.

6.  _____

7. _____

8.  _____

9.  _____

94

Use with text pages 322–323.

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LESSON 10

QUADRILATERALS

DEFINITION: A quadrilateral is a four sided polygon.

The relationship between special kinds of quadrilaterals is show by the diagram below.

QUADRILATERALS

TRAPEZOID

ISOSCELES TRAPEZOID

PARALLELOGRAM

RHOMBUS

RECTANGLE

SQUARE

For example, RECTANGLE is under PARALLELOGRAM because a RECTANGLE is a special kind of PARALLELOGRAM. A rectangle has all the properties of a parallelogram. What makes a rectangle different from a parallelogram is the additional property of four right angles.

TYPE: READ "QUADRILATERALS

The turtle knows how to draw:

QUADRILATERAL VTLI

TRAPEZOID IHFE

TRAPEZOID.ISOSCELES CAZX

PARALLELOGRAM XVLT

RHOMBUS AZEC

RECTANGLE LFHI

SQUARE TVXZ

LESSON 10 - QUADRILATERALS

As you make the turtle draw each of the above quadrilaterals, fill in each blank with the correct response. If there is no answer, write NONE.

1. TYPE: DRAW QUADRILATERAL

   List the parallel sides _____

   List the equal sides _____

   List the equal angles _____

   The sum of all angles _____+_____+_____+_____=

2. TYPE: DRAW TRAPEZOID

   List the parallel sides _____&_____

   List the equal sides _____

   List the equal angles _____

   The sum of all angles _____+_____+_____+_____=

3. TYPE: DRAW TRAPEZOID.ISOSCELES

   List the parallel sides _____&_____

   List the equal sides _____=_____

   List the equal angles _____=_____

   The sum of all angles _____+_____+_____+_____=

LESSON 10 - QUADRILATERALS

4. TYPE: DRAW PARALLELOGRAM

List the parallel sides _____&_____ _____&_____

List the equal sides _____=_____ _____=_____

List the equal angles _____=_____ _____=_____

The sum of all angles _____+_____+_____+_____=

5. TYPE: DRAW RHOMBUS

List the parallel sides _____&_____ _____&_____

List the equal sides _____=_____=_____=_____

List the equal angles _____=_____=_____=_____

The sum of all angles _____+_____+_____+_____=

6. TYPE: DRAW RECTANGLE

List the parallel sides _____&_____ _____&_____

List the equal sides _____=_____ _____=_____

List the equal angles _____=_____=_____=_____

The sum of all angles _____+_____+_____+_____=

LESSON 10 - QUADRILATERALS

7. TYPE: DRAW SQUARE

List the parallel sides _____&_____ _____&_____

List the equal sides _____=_____ _____=_____

List the equal angles _____=_____=_____=_____

The sum of all angles _____+_____+_____+_____=

name

PRACTICE

WORKSHEET **117**

Quadrilaterals

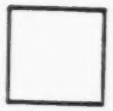
Some quadrilaterals have special names.

Trapezoid

Parallelogram

Rhombus

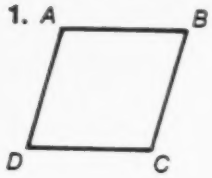
Rectangle



Square

Practice • Classify each quadrilateral as a *trapezoid*, *parallelogram*, *rhombus*, *rectangle*, or *square*. List each name that applies to the figure.

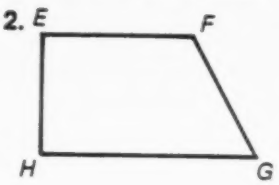
1.



_____

_____

2.



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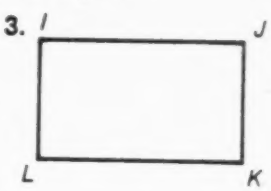
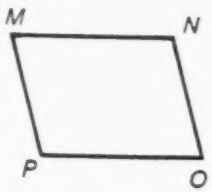
3.



_____

_____

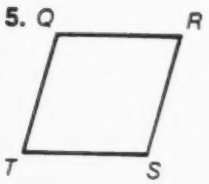
4.



_____

_____

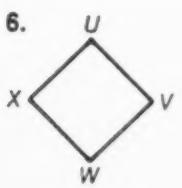
5.



_____

_____

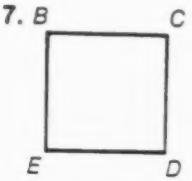
6.



_____

_____

7.



_____

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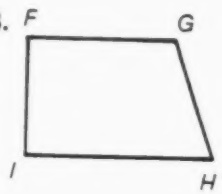
8.



_____

_____

Name the pairs of parallel sides in

9. figure *ABCD*.

_____

_____

10. figure *EFGH*.

_____

_____

11. figure *IJKL*.

_____

_____

12. figure *MNOP*.

_____

_____

13. figure *QRST*.

_____

_____

14. figure *UVWX*.

_____

_____

15. figure *BCDE*.

_____

_____

16. figure *FGHI*

_____

_____

Name the congruent sides in

17. figure *ABCD*.

_____

_____

18. figure *EFGH*.

_____

_____

19. figure *IJKL*.

_____

_____

20. figure *MNOP*.

_____

_____

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Use with text pages 322–323.

LESSON 11

CONGRUENT POLYGONS

CHECKLIST OF ACTIVITIES

_____1. READ: PAGE 101

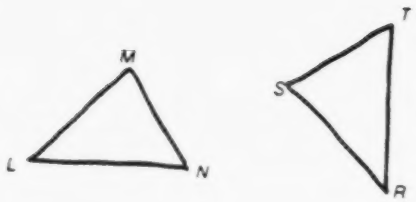
_____2. WRITE: PAGE 102

_____3. DO COMPUTER ACTIVITY: PAGES 103-105

_____4. WRITE: PAGE 106

Congruent Polygons

Congruent polygons have the same size and shape. Trace triangle LMN ($\triangle LMN$). Place your triangle above $\triangle RST$ with vertex L on vertex R, vertex M on vertex S, and vertex N on vertex T. Note that your tracing fits $\triangle RST$ exactly.



$$\triangle LMN \cong \triangle RST$$

The parts that match are called **corresponding parts**. If the polygons are congruent, then their corresponding parts are also congruent.

Matching vertices

$$L \leftrightarrow R$$
$$M \leftrightarrow S$$
$$N \leftrightarrow T$$

Corresponding sides

$$\overline{LM} \cong \overline{RS}$$
$$\overline{MN} \cong \overline{ST}$$
$$\overline{NL} \cong \overline{TR}$$

Corresponding angles

$$\angle L \cong \angle R$$
$$\angle M \cong \angle S$$
$$\angle N \cong \angle T$$

An angle can be named by its vertex

If $m\angle L = 30°$, then $m\angle R = 30°$.

If $\overline{LN}$ is 3 centimeters long, then $\overline{RT}$ is also 3 centimeters long.

name

RETEACHING

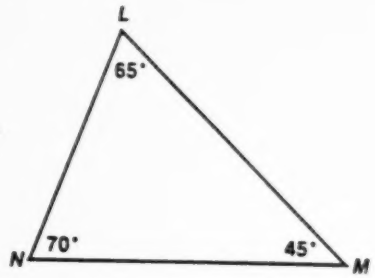
WORKSHEET **118**

Congruent Polygons

Congruent polygons have the same size and shape.
Is triangle *LMN* congruent to triangle *XYZ* below?

Step 1 Cut out triangle *XYZ* below.

Step 2 Slide, flip, or turn the triangle to fit over triangle *LMN*.



Triangle *LMN* is congruent to triangle *XYZ*. ($\triangle LMN \cong \triangle XYZ$)

The parts that fit together are corresponding parts. Corresponding parts are congruent.

corresponds to

$\overline{LM} \cong \overline{YZ}$	$\angle L \cong \angle Y$
$\overline{MN} \cong \overline{ZX}$	$\angle M \cong \angle Z$
$\overline{NL} \cong \overline{XY}$	$\angle N \cong \angle X$

Equal Angle Measure

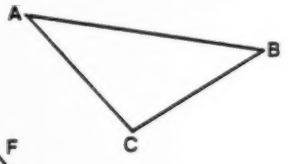
$m\angle L = 65°$ so $m\angle Y = 65°$
$m\angle M = 45°$ so $m\angle Z = 45°$
$m\angle N = 70°$ so $m\angle X = 70°$

Cut out the polygons below to help you answer the question.

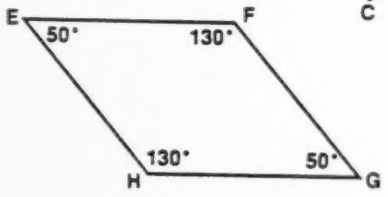
1. Is triangle *ABC* congruent to triangle *STU*? _____

Are there any corresponding parts? _____

Are there any congruent parts? _____

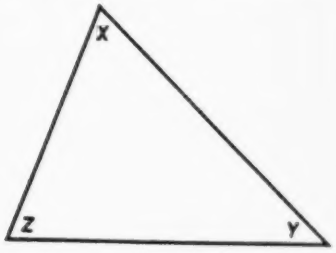


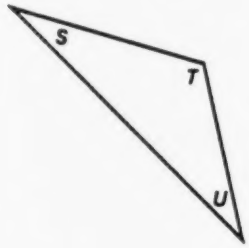
2. Is quadrilateral *EFGH* congruent to quadrilateral *PQRS*? _____

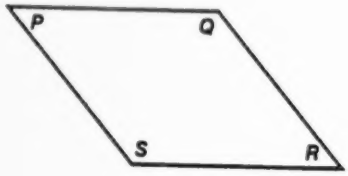


Complete.

$\overline{EF} \cong$ _____	$\angle E \cong \angle$ _____	$m\angle E = 50°$ so $m\angle$ _____ = _____ °
$\overline{FG} \cong$ _____	$\angle F \cong \angle$ _____	$m\angle F = 130°$ so $m\angle$ _____ = _____ °
$\overline{GH} \cong$ _____	$\angle G \cong \angle$ _____	$m\angle G = 50°$ so $m\angle$ _____ = _____ °
$\overline{HE} \cong$ _____	$\angle H \cong \angle$ _____	$m\angle H = 130°$ so $m\angle$ _____ = _____ °







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Use with text pages 324–325.

LESSON 11

CONGRUENT POLYGONS

TYPE: READ *CONGRUENT.POLYGONS

TYPE: DRAW

TYPE: MATCH.1

The two triangles appearing on the screen are exact duplicates of each other.

This means all the corresponding parts are congruent (equal in size). Can you match the corresponding parts ?

Fill in the table below. The symbol for congruence is $\cong$.

Angle H $\cong$ Angle ___ Side AZ $\cong$ Side ___

Angle I $\cong$ Angle ___ Side AX $\cong$ Side ___ .

Angle V $\cong$ Angle ___ Side XZ $\cong$ Side ___

The measure of AZ = _____cm ; so the measure of HI = _____

The measure of ∠I = _____ ; so the measure of ∠Z = _____

LESSON 11 - CONGRUENT POLYGONS

TYPE: DRAW MATCH.2

The two quadrilaterals appearing on the screen are congruent figures. However, one has been turned on its side. Can you match the corresponding parts which are congruent ? Be careful. The ORDER OF THE LETTERS is important. Fill in the chart below.

Angle A $\cong$ Angle ___ Side TL $\cong$ Side ___

Angle I $\cong$ Angle ___ Side TZ $\cong$ Side ___

Angle F $\cong$ Angle ___ Side ZX $\cong$ Side ___

Angle E $\cong$ Angle ___ Side XL $\cong$ Side ___

The measure of ZX = _____cm ;so the measure of AI = _____cm

The measure of ∠E = _____ ; so the measure of ∠L = _____

TYPE: DRAW MATCH.3

∠ILF $\cong$ ∠ IH $\cong$

∠LFI $\cong$ ∠ HF $\cong$

∠LIF $\cong$ ∠ FI $\cong$

The measure of LF = _____ ; so the measure of HI = _____

The measure of ∠LIF = _____ ; so the measure of ∠HFI = _____

LESSON 11 - CONGRUENT POLYGONS

TYPE: DRAW MATCH.4

$\angle TXL \cong \angle$ $XV \cong$

$\angle XTL \cong \angle$ $VT \cong$

$\angle XLT \cong \angle$ $XT \cong$

The measure of $\angle XTL$ = _____ ; so the measure of $\angle TXV$ = _____

The measure of XT = _____cm ; so the measure of TX = _____cm

Remember: Save as LESSON.11

name

PRACTICE

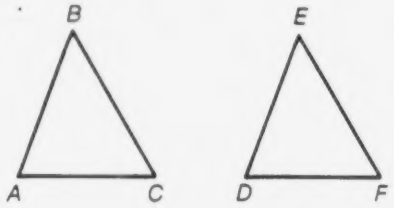
WORKSHEET **118**

Congruent Polygons

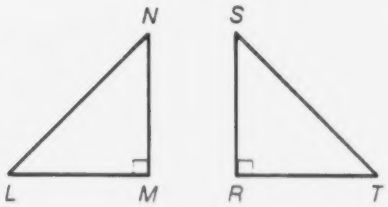
Congruent polygons have the same size and shape.

$\triangle ABC \cong \triangle DEF$

Corresponding sides	Corresponding angles
$\overline{AB} \cong \overline{DE}$	$\angle A \cong \angle D$
$\overline{BC} \cong \overline{EF}$	$\angle B \cong \angle E$
$\overline{AC} \cong \overline{DF}$	$\angle C \cong \angle F$

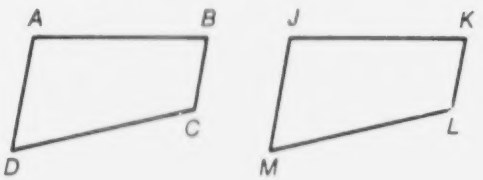


Practice • $\angle LNM \cong \angle RST$. Complete.



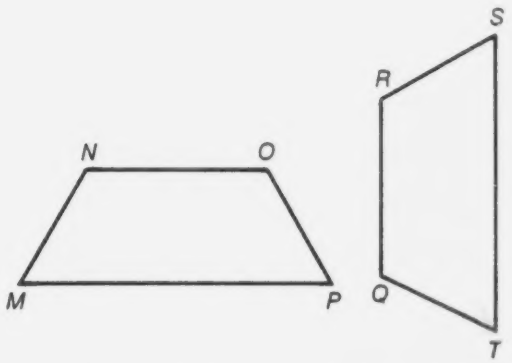
1. $\overline{LN} \cong$ _____
2. $\angle M \cong$ _____
3. $\overline{NM} \cong$ _____
4. $\angle L \cong$ _____
5. Suppose m$\angle N = 50°$, then m$\angle S =$ _____
6. Suppose m$\overline{LM} = 5.6$ cm, then m$\overline{RT} =$ _____

Mixed Practice • Quadrilaterals *ABCD* and *JKLM* are congruent. Complete.



7. $\overline{AB} \cong$ _____
8. $\angle A \cong$ _____
9. $\overline{BC} \cong$ _____
10. $\angle B \cong$ _____
11. $\overline{DC} \cong$ _____
12. $\angle C \cong$ _____
13. $\overline{AD} \cong$ _____
14. $\angle D \cong$ _____

Trapezoids *MNOP* and *QRST* are congruent.



15. m$\angle N = 115°$. What is m$\angle Q$? _____
16. m$\angle P = 40°$. What is m$\angle S$? _____
17. Which side of trapezoid *QRST* is congruent to $\overline{ON}$? _____
18. Which side of trapezoid *QRST* is congruent to $\overline{OP}$? _____
19. Suppose $\overline{MN}$ is 5.3 cm long. Name the corresponding part in trapezoid *QRST* and give its length. _____

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Use with text pages 324–325.

LESSON 12

SYMMETRY

CHECKLIST OF ACTIVITIES

_____1. READ: PAGE 108

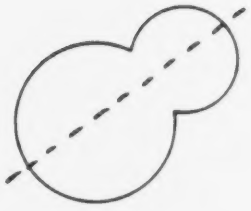
_____2. WRITE: PAGE 109

_____3. DO COMPUTER ACTIVITY: PAGES 110-112

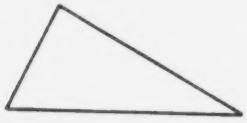
_____4. WRITE: PAGE 113

Symmetry and Reflections

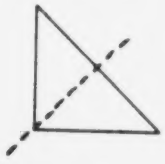
A **line of symmetry** separates a figure in a plane so that one part is an exact **reflection** of the other. The blue line in the figure is a line of symmetry.



Some figures have no lines of symmetry. Some have one line of symmetry. Some have many lines of symmetry.



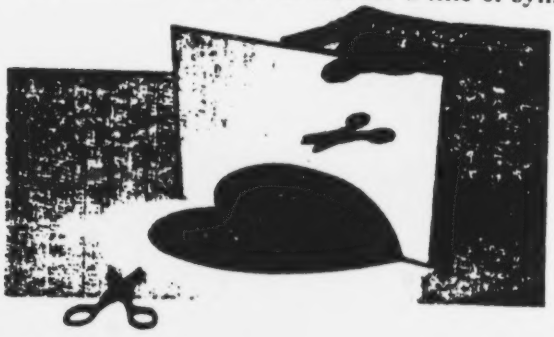
No lines of symmetry



One line of symmetry

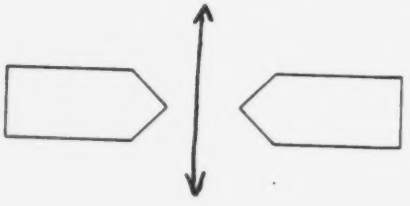
Three lines of symmetry

You can use a mirror to test for a line of symmetry.



Hold a mirror along a line of symmetry (and perpendicular to the plane of the figure). If you see the original figure, the line is a line of symmetry.

This drawing shows a pentagon and its **mirror image**. The dotted line is a line of symmetry for the two figures. If you **flip** the figure along the line of symmetry, you obtain its mirror image.



name

RETEACHING

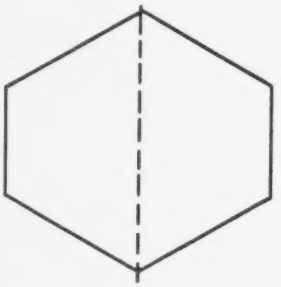
WORKSHEET **119**

Symmetry and Reflections

Step 1 Cut out figure A below.

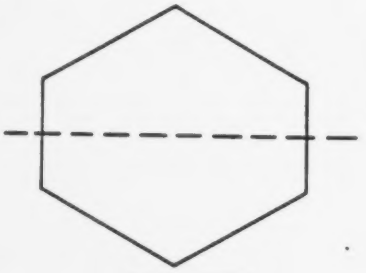
Step 2 Fold along the dotted line shown here.

The halves match.
The figure is **symmetrical.**



Step 3 Unfold the figure.

Step 4 Fold it along the dotted line shown here.

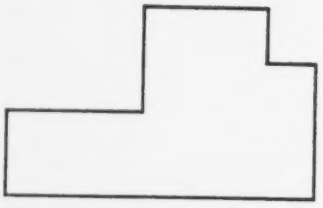


This figure has two **lines of symmetry.**

How many lines of symmetry does figure B have?

Step 1 Cut out figure B below.

Step 2 Try to fold figure B to find lines of symmetry.

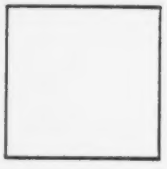


There are no lines of symmetry.

Complete.

1. Cut out figure C below. Fold it to find lines of symmetry.

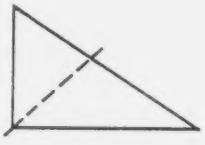
   Figure C has _____ lines of symmetry.



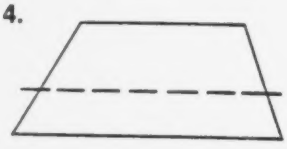
Is the dotted line a line of symmetry? Ring *yes* or *no.*

2.

   Yes No

3. 

   Yes No

4. 

   Yes No

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Figure A

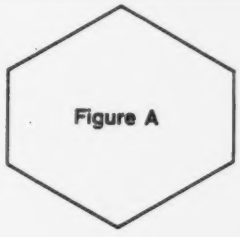


Figure B

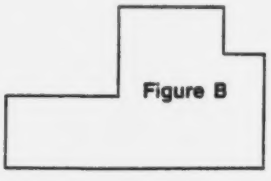
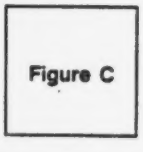


Figure C



LESSON 12

SYMMETRY

TYPE: READ "SYMMETRY

TYPE: DRAW SYMMETRY.1

1.Make a sketch of the screen.

Notice the figure has one line of symmetry and that each half is the exact reflection of the other.

TYPE: DRAW SYMMETRY.2

2. Make a sketch of the screen.

Notice the rectangle has two lines of symmetry.

3. How many lines of symmetry for a square? _____

LESSON 12 - SYMMETRY

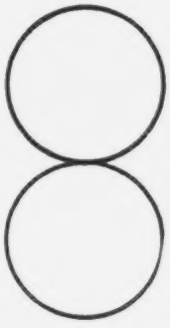
TYPE: DRAW SYMMETRY.3

4. Make a sketch of the screen.

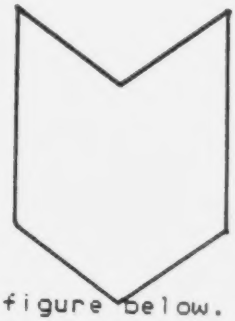
Predict the lines of symmetry for each of the following figures. Then type PROBLEM.# (# can be 1, 2, or 3) to check your results.

1.

2.



3.



Write the procedures to complete each figure below. If you use SETXY, the procedures are easy to write.

4. TYPE: DRAW PROBLEM.4 TO COMPLETE.4

SKETCH

LESSON 12 - SYMMETRY

5. TYPE: DRAW PROBLEM.5 TO COMPLETE.5

SKETCH

Remember: Save as LESSON.12

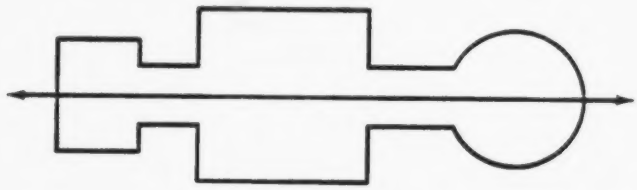
name

PRACTICE

WORKSHEET **119**

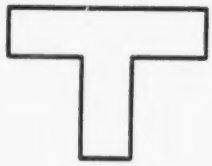
Symmetry and Reflections

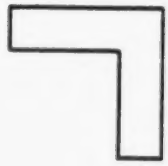
A **line of symmetry** separates a figure in a plane so that one part is an exact reflection of the other. The line in the figure is a line of symmetry.



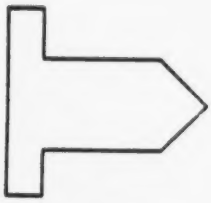
Practice • Each figure has one line of symmetry. Draw the line of symmetry.

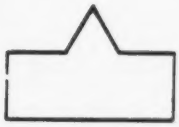
1.

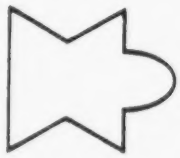
2. 

3. 

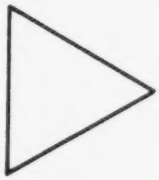
4.

5. 

6. 

7. 

8.

9. 

10.

11.

12.

Each figure has more than one line of symmetry. Draw the lines of symmetry.

13.

14.

15.

16.

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LESSON 13

SIMILAR POLYGONS

CHECKLIST OF ACTIVITIES

_____1. READ: PAGE 115

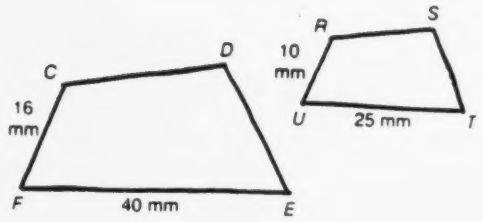
_____2. WRITE: PAGE 116

_____3. DO COMPUTER ACTIVITY: PAGES 117-122

_____4. WRITE: PAGE 123

Similar Polygons

Similar polygons have the same shape.



Corresponding angles of similar polygons are congruent.

$\angle C \cong \angle R$, $\angle D \cong \angle S$, $\angle E \cong \angle T$, and $\angle F \cong \angle U$.

In similar polygons, the ratios of the lengths of corresponding sides are equal.

$$\frac{m\overline{CF}}{m\overline{RU}} = \frac{m\overline{CD}}{m\overline{RS}} = \frac{m\overline{DE}}{m\overline{ST}} = \frac{m\overline{EF}}{m\overline{TU}}$$

You can use cross products to show that the ratios are equal.

length of $\overline{CF}$ $\longrightarrow$ $\frac{16}{10} = \frac{40}{25}$ $\longleftarrow$ length of $\overline{EF}$
length of $\overline{RU}$ $\longrightarrow$ $\frac{16}{10} = \frac{40}{25}$ $\longleftarrow$ length of $\overline{TU}$

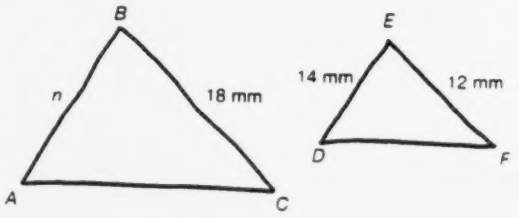
$$16 \times 25 = 10 \times 40$$
$$400 = 400$$

Triangles ABC and DEF are similar. Use cross products to find the length of $\overline{AB}$.

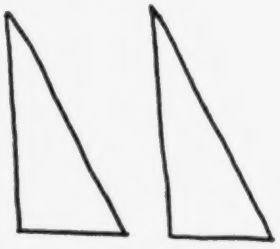
length of $\overline{AB}$ $\longrightarrow$ $\frac{n}{14} = \frac{18}{12}$ $\longleftarrow$ length of $\overline{BC}$
length of $\overline{DE}$ $\longrightarrow$ $\frac{n}{14} = \frac{18}{12}$ $\longleftarrow$ length of $\overline{EF}$

$$12n = 14(18)$$
$$12n = 252$$
$$n = 21$$

The length of $\overline{AB}$ is 21 millimeters.



You know that congruent polygons have the same shape and size. The ratios of corresponding sides are 1:1, or $\frac{1}{1}$.



Are all congruent polygons also similar?
Are all similar polygons also congruent?

name

RETEACHING

WORKSHEET **120**

Similar Polygons

Similar polygons have the same shape.

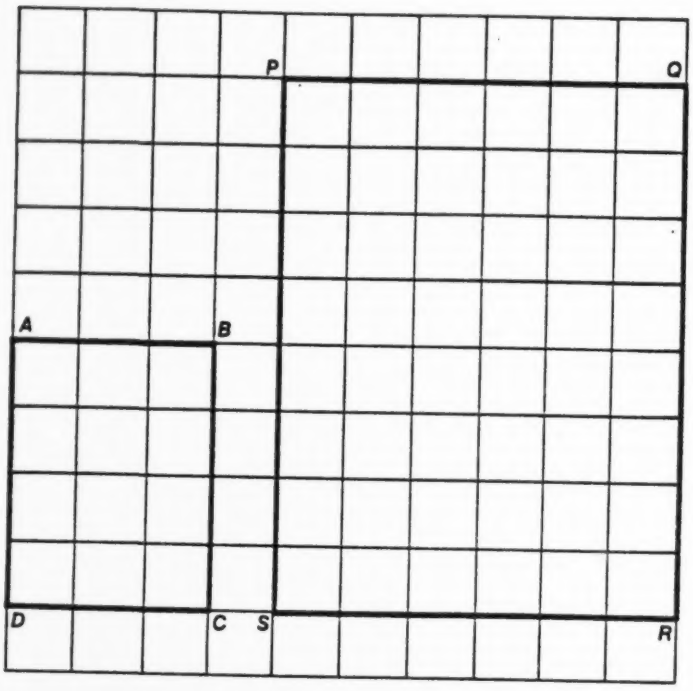
Corresponding angles of similar polygons are congruent.

$\angle A = \angle P$ $\quad \angle B = \angle Q$
$\angle C = \angle R$ $\quad \angle D = \angle S$

Side *AB* corresponds to side *PQ*.
Side *BC* corresponds to side *QR*.
Side *CD* corresponds to side *RS*.
Side *DA* corresponds to side *SP*.

The ratios of the lengths of corresponding sides are equal.

You can use cross products to find the length of corresponding sides.



Complete.

side *AB* → $\frac{3}{6} = \frac{4}{?}$ ← side *BC*
side *PQ* → ← side *QR*

$3 \times ? = 6 \times 4$

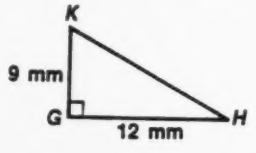
$3 \times ? =$ _____ $\quad ? =$ _____ ÷ _____ The length of *QR* is _____ centimeters.

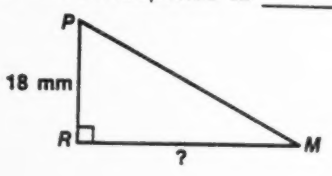
Complete.

1. $\overline{KG}$ corresponds to _____. 2. $\overline{GH}$ corresponds to _____. 3. $\overline{HK}$ corresponds to _____.

4. Side *KG* → $\frac{9}{18} = \frac{12}{?}$ ← side *GH*
Side *PR* → ← side *RM*

The length of *RM* is _____ millimeters.

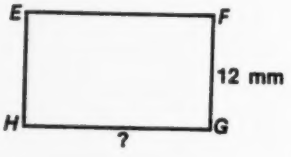


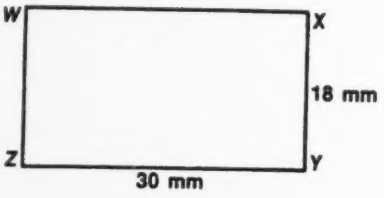


5. $\overline{EF}$ corresponds to _____.
$\overline{FG}$ corresponds to _____.
$\overline{GH}$ corresponds to _____.
$\overline{HE}$ corresponds to _____.

Side *FG* → $\frac{\square}{\square} = \frac{?}{\square}$ ← side *GH*
Side *XY* → ← side *YZ*

The length of *GH* is _____ millimeters.





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1 1 5

Use with text pages 328–329.

LESSON 13

SIMILAR POLYGONS

Teach the turtle the following:

```
TYPE:  TO DESIGN
       FD 20 RT 45 FD 50 RT 135
       FD 20 RT 45 FD 50 RT 135
       HT
TYPE:  TO SIMILAR.DESIGN
       FD 40 RT 45 FD 100 RT 135
       FD 40 RT 45 FD 100 RT 135
       HT

TYPE: DRAW DESIGN
TYPE: SIMILAR.DESIGN
```

Notice the two parallelogram on the screen. They have the SAME SHAPE but are of different size. In fact, the larger parallelogram's sides are twice the length of the smaller parallelogram. The ratio of the sides is two to one.

However, notice that the ANGLES are congruent.

Teach the turtle the following:

```
TYPE: TO NEW.DESIGN :LENGTH :W
      FD :LENGTH RT 45 FD :WIDTH RT 135
      FD :LENGTH RT 45 FD :WIDTH RT 135
      HT
```

LESSON 13 - SIMILAR POLYGONS

Now TYPE: DRAW NEW.DESIGN 10 20

TYPE: NEW.DESIGN 20 40

TYPE: NEW.DESIGN 40 80

1. Explain what's happening.

_____

2. Sketch the result.

Teach the turtle the following procedure. This procedure will create any kind of parallelogram (rhombus, square, or rectangle) by inputing the LENGTH, WIDTH, and ANGLE sizes.

```
TYPE: TO PARALLELOGRAM :LENGTH :WIDTH :ANGLE
      REPEAT 2 [FD :LENGTH RT :ANGLE FD :WIDTH RT 180 -
:ANGLE]
      HT
```

Using PARALLELOGRAM, give the command that will produce the following result.

1. A square with side length of 40 turtle steps.

   COMMAND: PARALLELOGRAM

2. A square similar to the square in 1. but twice the size.

   COMMAND: PARALLELOGRAM

3. A rhombus with side length of 40 and an angle of 45 degrees.

COMMAND: PARALLELOGRAM

4. A rhombus similar to the rhombus in 2. but half the size.

COMMAND: PARALLELOGRAM

5. A rectangle with sides of 20 and 50 turtle steps.

COMMAND: PARALLELOGRAM

6. A rectangle similar to the rectangle in 3. but three times the size.

COMMAND: PARALLELOGRAM

7. A parallelogram with sides of 50 and 70 turtle steps and and angle of 55 degrees.

COMMAND: PARALLELOGRAM

8. A parallelogram similar to the parallelogram in 4. but 1.5 times the size.

COMMAND: PARALLELOGRAM

Below are two procedures. The first one constructs a square. The second one constructs two SIMILAR squares when you input the width of the original and the magnification factor.

LESSON 13 - SIMILAR POLYGONS

Teach the turtle the following:

```
TYPE:  TO SQUARE :WIDTH
       REPEAT 4 [FD :WIDTH RT 90]
       HT

TYPE:  TO SIMILAR.SQUARE :WIDTH :MAGNIFY
       SQUARE :WIDTH
       SQUARE :WIDTH * :MAGNIFY
```

Try These:

```
TYPE: DRAW SIMILAR.SQUARE 20 2
   SKETCH


TYPE: DRAW SIMILAR.SQUARE 40 2
   SKETCH


TYPE: DRAW SIMILAR.SQUARE 40 3
   SKETCH
```

Create procedures which will produce similar designs using the magnification factor as was done with square above.

LESSON 13 - SIMILAR POLYGONS

6. TO TRIANGLE :S TO SIMILAR.TRIANGLE :S :M

REPEAT 3 [FD :S RT 120]

HT

Magnification 3

TYPE: DRAW SIMILAR.TRIANGLE 30 3

a. measure the side of small triangle ____cm

b. measure the side of large triangle _____cm

c. Is 3 times the length of small side equal to 1 large side? _____

7. TO PENTAGON :S TO SIMILAR.PENTAGON :S :M

REPEAT 5 [FD :S RT 72]

HT

Magnification 2.5

TYPE: DRAW SIMILAR.PENTAGON 30 2.5

a. measure one side of small pentagon _____cm

b. measure one side of large pentagon _____cm

c. Is 2.5 times the small side equal to one large side? ___

LESSON 13 - SIMILAR POLYGONS

8. TO RECTANGLE :L :W
:M

TO SIMILAR.RECTANGLE :L :W

```
REPEAT 2 [FD :L RT 90 FD :W RT 90]
HT
```

Magnification .5

TYPE: DRAW SIMILAR.RECTANGLE 50 100 .5

a. measure the length of small rectangle _____cm

b. measure the length of large rectangle _____cm

c. measure the width of small rectangle _____cm

d. measure the width of large rectangle _____cm

e. Is .5 times the large width equal to the small width? _____

f. Is .5 times the large length equal to the small length? _____

9. TO CIRCLE :S

TO SIMILAR.CIRCLE :S :M

```
REPEAT 36 [ FD :S RT 10]
HT
```

Magnification .75

TYPE: DRAW SIMILAR.CIRCLE 10 .75

a. measure the diameter of small circle _____cm

b. measure the diameter of large circle _____cm

c. Is the diameter of large circle times .75 equal to the diameter of small circle? _____

Remember: Save as LESSON.13

name

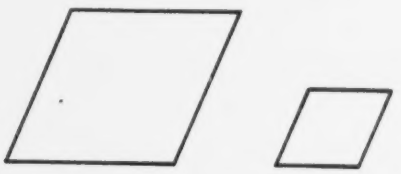
PRACTICE

WORKSHEET **120**

Similar Polygons

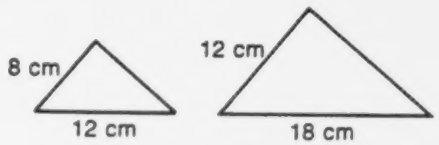
Similar polygons have the same shape. **Corresponding angles** of similar polygons are congruent.

The ratios of the lengths of **corresponding sides** are equal.

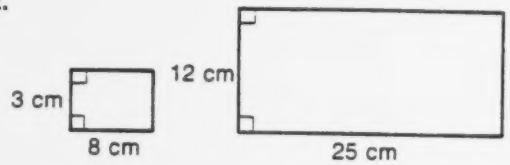


Practice • The corresponding angles of the figures are congruent. Compare the lengths of the corresponding sides. Are the figures similar?

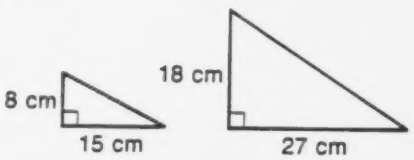
1.



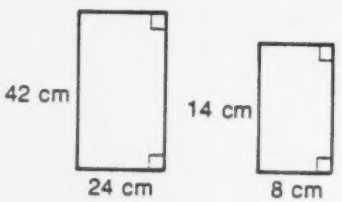
2.



3.

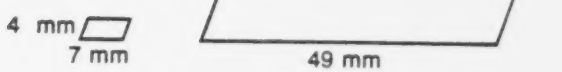


4.

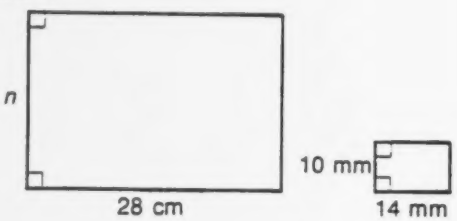


The figures in each pair are similar. Find the missing measure.

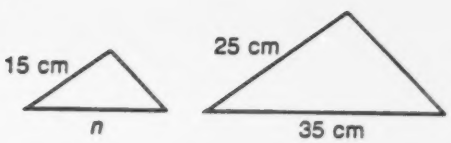
5.



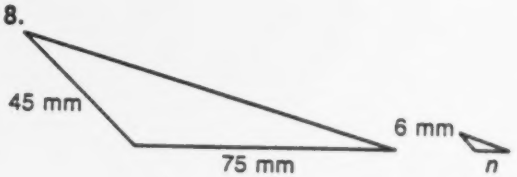
6.



7.



8.



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LESSON 14

SOLID FIGURES

CHECKLIST OF ACTIVITIES

_____1. READ: PAGE 125

_____2. WRITE: PAGE 126

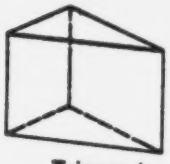
_____3. DO COMPUTER ACTIVITY: PAGES 127-133

_____4. WRITE: PAGE 134

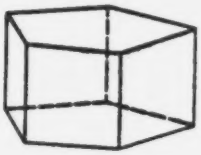
Solid Figures

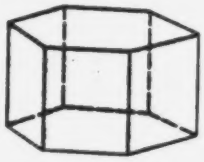
A **polyhedron** is a solid figure with flat surfaces called **faces**. Each face is a polygon.

A **prism** is a polyhedron with parallel **bases** that are congruent polygons. The shape of the base is used to name the prism. The other faces are parallelograms.

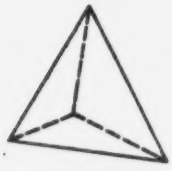

Triangular

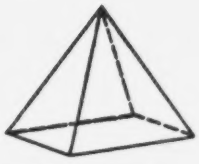
Rectangular

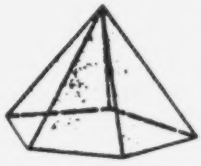

Pentagonal


Hexagonal

A **pyramid** is a polyhedron with one base that is a polygon. The shape of the base is used to name the pyramid. The other faces are triangles.


Triangular


Rectangular


Pentagonal

Hexagonal

Here are solid figures that are not polyhedrons. Their surfaces are not polygons.

Cylinder

Cone

Sphere

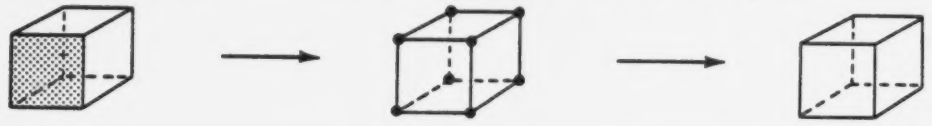
name

RETEACHING

WORKSHEET **121**

Solid Figures

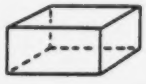
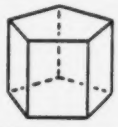
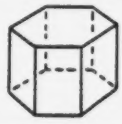
A **polyhedron** has **faces, vertices,** and **edges.**
A **prism** is a polyhedron with parallel bases that are congruent polygons.



There are 6 faces. There are 8 vertices. There are 12 edges.

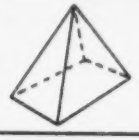
The shape of the base is used to name the figure.

Complete the table of prisms.

	Figure				
	Name	**Triangular Prism**	**Rectangular Prism**	**Pentagonal Prism**	**Hexagonal Prism**
1.	Shape of base				
2.	Number of faces				
3.	Number of vertices				
4.	Number of edges				

A **pyramid** is a polyhedron with one base that is a polygon.

Complete the table of pyramids.

	Figure				
	Name	**Triangular Prism**	**Rectangular Prism**	**Pentagonal Prism**	**Hexagonal Prism**
5.	Shape of base				
6.	Number of faces				
7.	Number of vertices				
8.	Number of edges				

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LESSON 14

SOLID FIGURES:
PRISMS, PYRAMIDS, CONES, CYLINDERS AND SPHERES

TYPE: READ "PRISMS

TYPE: DRAW PRISM.TRI

On the screen there should be a triangular prism. Each corner point is called a VERTEX. Each EDGE is a line segment. Each side is called a FACE.

Make a sketch of the screen.

The vertices are _____ _____ _____ _____ _____ _____

The edges are _____ _____ _____ _____ _____ _____ _____ _____ _____

The faces are _____ _____ _____ _____ _____

LESSON 14 - SOLID FIGURES

TYPE: DRAW PRISM.RECT

Make a sketch

The vertices are _____ _____ _____ _____ _____ _____ _____ _____

The edges are _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

The faces are _____ _____ _____ _____ _____ _____

TYPE: DRAW PRISM.PENT

Make a sketch.

The vertices are _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

The edges are _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

The faces are _____ _____ _____ _____ _____ _____ _____

LESSON 14 - SOLID FIGURES

TYPE: DRAW PRISM.HEX

Make a sketch.

The vertices are _____ _____ _____ _____ _____ _____ _____
_____ _____ _____ _____ _____

The edges are _____ _____ _____ _____ _____ _____ _____ _____
_____ _____ _____ _____ _____ _____ _____ _____ _____ _____

The faces are _____ _____ _____ _____ _____ _____ _____ _____

TYPE: ERASE ALL

LESSON 14 - SOLID FIGURES

TYPE: READ *PYRAMIDS

TYPE: DRAW PYRAMID.TRI

Make a sketch

The vertices are ____ ____ ____ ____

The edges are ____ ____ ____ ____ ____ ____

The faces are ____ ____ ____ ____

TYPE: DRAW PYRAMID.RECT

Make a sketch.

The vertices are ____ ____ ____ ____ ____

The edges are ____ ____ ____ ____ ____ ____ ____ ____

The faces are ____ ____ ____ ____ ____

LESSON 14 - SOLID FIGURES

TYPE: DRAW PYRAMID.PENT

Make a sketch.

The vertices are _____ _____ _____ _____ _____ _____

The edges are _____ _____ _____ _____ _____ _____ _____ _____
_____ _____

The faces are _____ _____ _____ _____ _____ _____

TYPE: DRAW PYRAMID.HEX

Make a sketch.

The vertices are _____ _____ _____ _____ _____ _____ _____

The edges are _____ _____ _____ _____ _____ _____ _____ _____
_____ _____ _____ _____

The faces are _____ _____ _____ _____ _____ _____ _____

TYPE: ERASE ALL

_____

LESSON 14 - SOLID FIGURES

TYPE: READ "NOT.POLYHEDRONS

TYPE: DRAW CYLINDER

Notice that the figure is made up of 2 circles and a curved surface. Therefore, it can't be a polyhedron because all its faces are not flat and are not polygons.

Make a sketch.

TYPE: DRAW CONE

Study its characteristics.

Make a sketch.

LESSON 14 - SOLID FIGURES

TYPE: DRAW SPHERE

Study its characteristics.

Make a sketch.

Remember: Save as LESSON.14

name

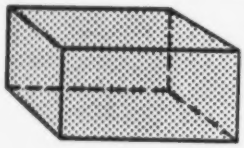
PRACTICE

WORKSHEET 121

Solid Figures

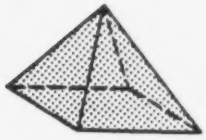
A **polyhedron** is a solid figure with flat surfaces called **faces.** Each face is a polygon. These are polyhedrons.

Triangular Prism



Rectangular Prism

Triangular Pyramid

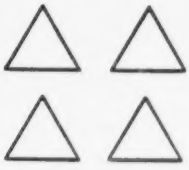


Rectangular Pyramid

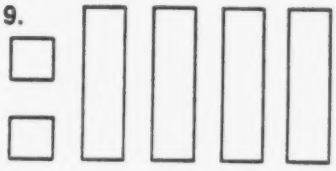
Practice • Is it a polyhedron? Write *yes* or *no.*

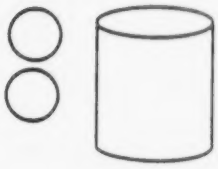
1. a pentagonal prism _____
2. a sphere _____
3. a hexagonal pyramid _____
4. a rectangular prism _____
5. a cylinder _____
6. a pentagonal pyramid _____

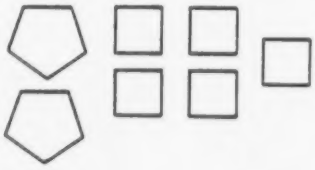
The faces or surfaces of a solid figure are shown. Is it a polyhedron? Write *yes* or *no.*

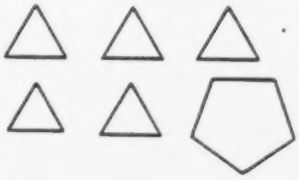
7.  _____

8. _____

9.  _____

10.  _____

11.  _____

12.  _____

Complete.

	Polyhedron	Number of faces	Number of vertices	Number of edges
13.	Triangular prism			
14.	Pentagonal prism			
15.	Rectangular prism			
16.	Hexagonal pyramid			

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LESSON 15

TRANSFORMATIONS:
SLIDES, FLIPS, AND ROTATIONS

CHECKLIST OF ACTIVITIES

_____1. READ: PAGES 136-137

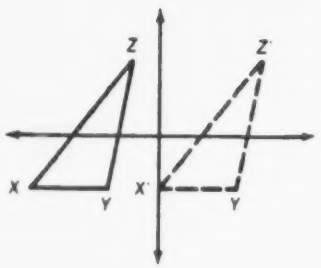
_____2. WRITE: PAGES 138-139

_____3. DO COMPUTER ACTIVITY: PAGES 140-145

_____4. WRITE: PAGES 146-149

Slides and Flips

A slide or translation moves a geometric figure to a new position. The drawing at the right shows a slide of 5 units to the right for $\triangle XYZ$.



Slide figure *ABCD* 4 units down.

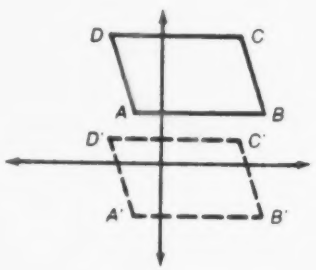
Step 1
Mark A′ 4 units down from point A.

Step 2
Mark B′ 4 units down from point B.

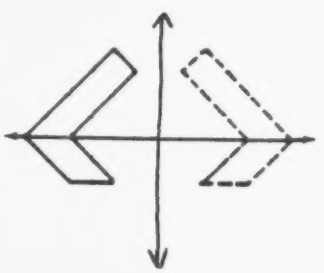
Step 3
Mark C′ 4 units down from point C.

Step 4
Mark D′ 4 units down from point D.

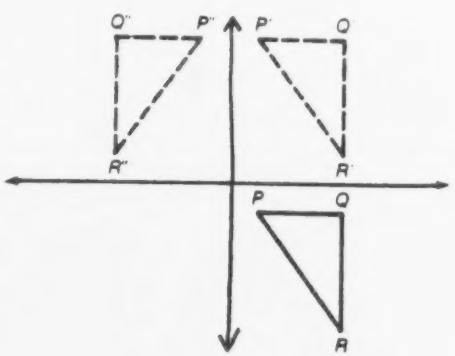
Step 5
Connect the points you marked in order.



A flip moves a geometric figure over a line to a new position. The drawing at the right shows a flip. The line that the figure is flipped over acts as a line of symmetry and the two figures are reflections of each other.



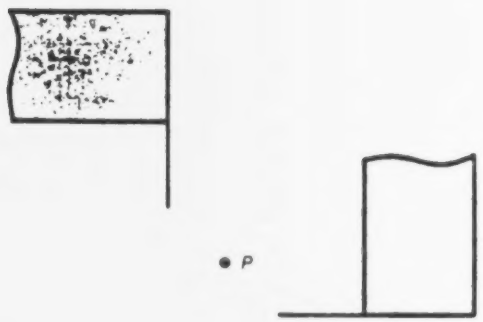
You can combine a slide and a flip. The drawing at the right shows how you would slide $\triangle PQR$ 6 units up and then flip it over the blue line.



Slides and flips are examples of **transformations.**

Rotations

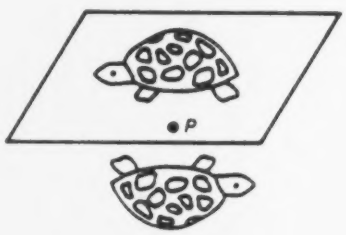
A **rotation** turns a geometric figure to a new position. The drawing at the right shows a rotation. Point *P* is the **turn center**. The sideward flag is the **rotation image** of the top flag.



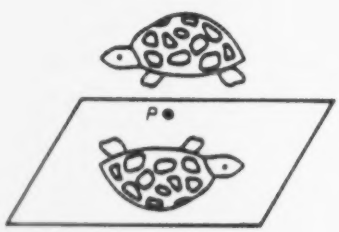
Is the upside-down figure a rotation image of the top figure?

Step 1
Trace the top figure.

Step 2
Hold down the tracing paper with your pencil point on point *P*. Turn the tracing paper.



Step 3
If the tracing matches the bottom figure, then the bottom figure is the rotation image of the top one.



name

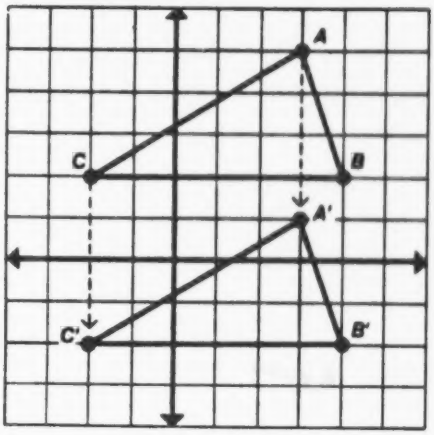
RETEACHING

WORKSHEET **139**

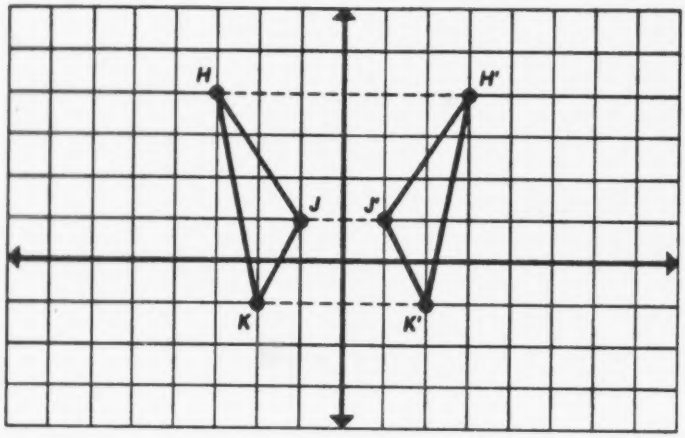
Slides and Flips

Slide $\triangle ABC$ 4 units down.

Point A' is 4 units down from A.
Point B' is 4 units down from B.
Point C' is 4 units down from C.

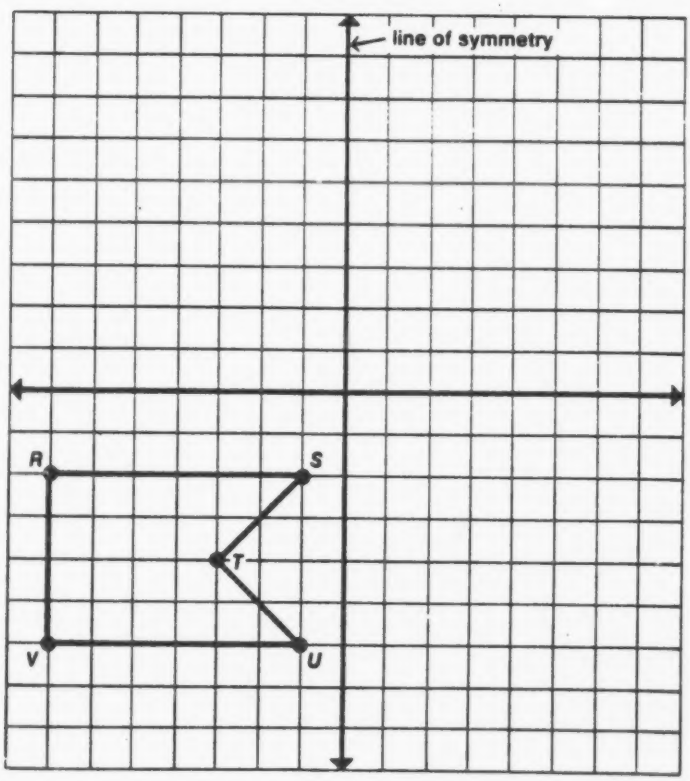


Flip $\triangle HJK$ over the line of symmetry to draw the reflection of $\triangle HJK$.



1. Slide figure $RSTUV$ 8 units up. Mark the figure $R'S'T'U'V'$.

2. Flip the figure $R'S'T'U'V'$ over the line of symmetry. Mark the figure $R''S''T''U''V''$.



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RETEACHING

WORKSHEET **140**

Rotations

A **rotation** turns a geometric figure to a new position.

Complete.

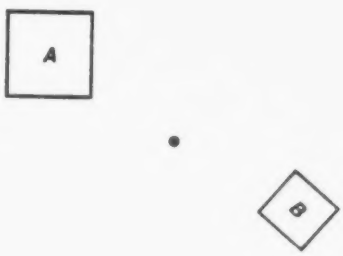
1. Trace the top figure. Hold down the tracing paper with your pencil point on point *P*. Point *P* is called the _____ center. Turn the tracing paper.

2. The tracing matches the bottom figure. The bottom figure is called the rotation _____ of the figure.

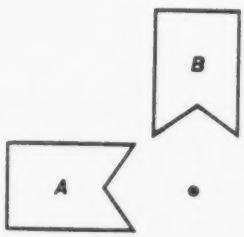
Use tracing paper. Is Figure *B* the rotation image of Figure *A*?

3. _____

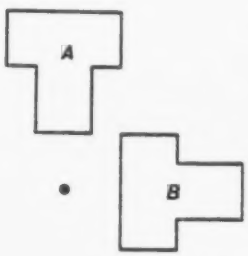
4. _____



5. _____

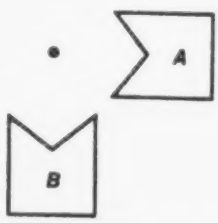


6. _____



7. _____

8. _____



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LESSON 15

TRANSFORMATIONS:
SLIDES, FLIPS, AND ROTATIONS

A motion that can be used to change the position of a figure constructed by the turtle without changing any of the features of the figure is called a SLIDE. The figure is moved a certain distance in a given direction but the new figure is still congruent to the original.

Explore the slide motion with the use of DESIGN. Sketch what each procedure constructs.

Teach the turtle:

```
TYPE: TO DESIGN
      FD 10 RT 90 FD 50 LT 90
      FD 10 RT 120
      REPEAT 2 [FD 30 RT 120]
      FD 10 LT 90 FD 50 RT 90
      HT
```

1. TO SLIDE.1 SKETCH

   DESIGN

   PU FD 60 PD

   DESIGN

2. TO SLIDE.2 SKETCH

```
DESIGN
PU RT 30 FD 50 LT 30
PD DESIGN
```

3. TO SLIDE.3 SKETCH

```
DESIGN
PU RT 180 FD 50 LT 180
PD DESIGN
```

4. TO SLIDE.4 SKETCH

```
PU SETXY -60 (-60) PD
REPEAT 4 [DESIGN PU RT 45 FD 40 LT 45 PD]
DESIGN
```

A second motion that can be used to change the position of a figure constructed by the turtle without changing any of the features of the figure is a TURN. The figure is turned by a given angle around a point called the center of the rotation.

Explore the turn motion with the use of DESIGN. Sketch what each procedure constructs.

LESSON 15 - TRANSFORMATIONS

1. TO TURN.1

```
DESIGN
RT 180
DESIGN
```

SKETCH

2. TO TURN.2

```
REPEAT 4 [DESIGN RT 90]
```

SKETCH

3. TO TURN.3

```
REPEAT 8 [PU FD 30 PD DESIGN PU BK 30 RT 45 PD]
```

SKETCH

4. TO TURN.4

```
REPEAT 10 [DESIGN RT 36]
```

SKETCH

5. TO TURN.5

```
REPEAT 36 [DESIGN RT 10]
```

SKETCH

LESSON 15 - TRANSFORMATIONS

A third motion that can be used to change the position of a figure constructed by the turtle without changing any of the features of the figure is called a FLIP.

The flip figure looks like the mirror image of the original figure.

In a mirror image right turns look like left turns; left turns look like right turns.

Explore each design and its flip design. Sketch the final result.

1. TO DESIGN.2 SKETCH

```
FD 50 BK 30
RT 45 FD 30
BK 30 LT 45 BK 20

TO FLIP.2
PU LT 90 FD 10 RT 90 PD
FD 50 BK 30
LT 45 FD 30
BK 30 RT 45 BK 20 HT

TYPE: DRAW DESIGN.2
TYPE: FLIP.2
```

2. TO DESIGN.3 SKETCH

```
REPEAT 2 [FD 40 RT 90 FD 100 RT 90]

TO FLIP.3
PU LT 90 FD 5 RT 90 PD
REPEAT 2 [FD 40 LT 90 FD 100 LT 90] HT
```

TYPE: DRAW DESIGN.3

TYPE: FLIP.3

3. TO DESIGN.4 SKETCH

```
REPEAT 6[ FD 20 RT 60]

TO FLIP.4
PU LT 90 FD 10 RT 90 PD
REPEAT 6[ FD 20 LT 60] HT
```

TYPE: DRAW DESIGN.4

TYPE: FLIP.4

4. TO DESIGN.5 SKETCH

```
FD 50 BK 30 LT 90 BK 10
FD 30 RT 90 FD 20 BK 20
LT 90 BK 20 RT 90 BK 20

TO FLIP.5
PU RT 90 FD 20 LT 90 PD
FD 50 BK 30 RT 90 BK 10
FD 30 LT 90 FD 20 BK 20
RT 90 BK 20 LT 90 BK 20 HT
```

LESSON 15 - TRANSFORMATIONS

TYPE: DRAW DESIGN.5

TYPE: FLIP.5

Remember: Save as LESSON.15

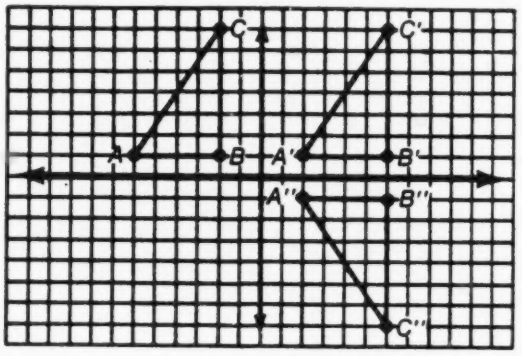
name

PRACTICE

WORKSHEET **139**

Slides and Flips

Slide △ *ABC* 8 units to the right and then **flip** it over the dark line.

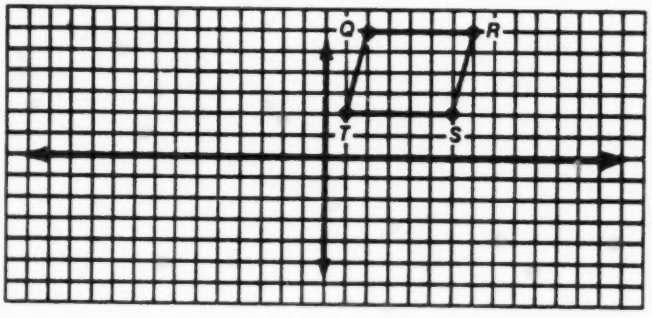


Slides and flips are examples of **transformations.**

Practice • Complete.

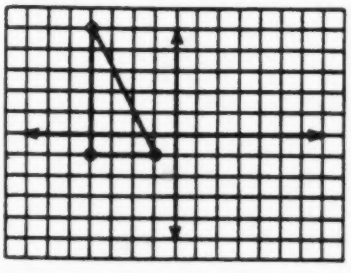
1. Slide each point *Q*, *R*, *S*, and *T* 9 units to the left. Label the new figure *Q'R'S'T'*.

2. Flip *QRST* over the dark line. Label the new figure *Q''R''S''T''*

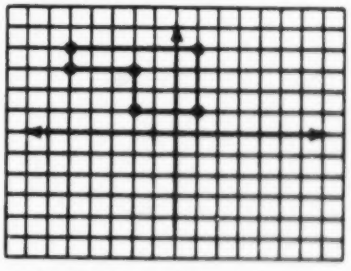


Mixed Practice • Draw the side images.

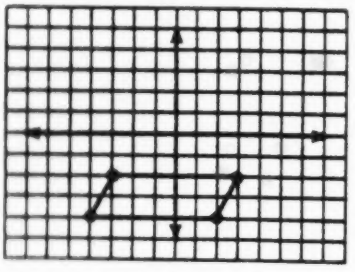
3. 5 units to the right



4. 6 units down

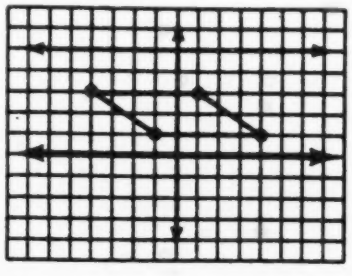


5. 7 units up

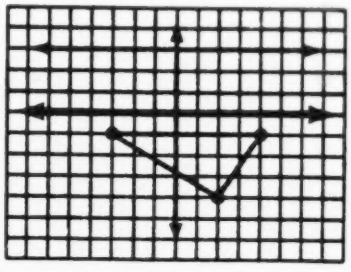


Draw the flip images on the other side of the dark line.

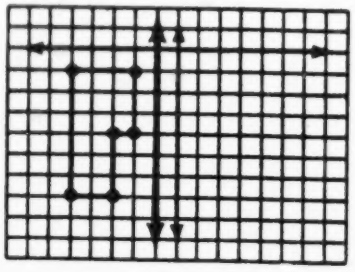
6.



7.



8.



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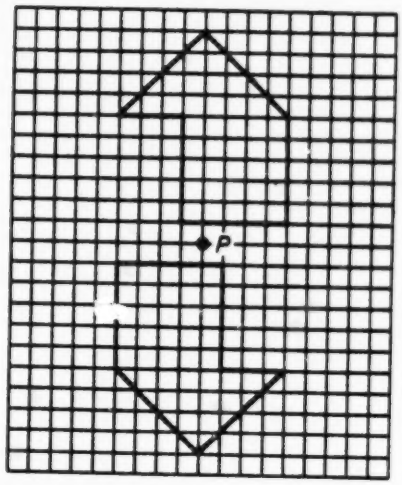
PRACTICE

WORKSHEET **140**

Rotations

A **rotation** turns a geometric figure to a new position.



Is the figure a rotation image of the top figure?

Step 1 Trace the top figure.

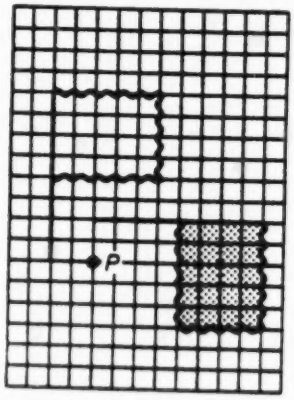
Step 2 Hold down the tracing paper with your pencil point on point *P*. Turn the tracing paper.

Step 3 If the tracing matches the bottom figure, then the bottom figure is the rotation image of the top one.

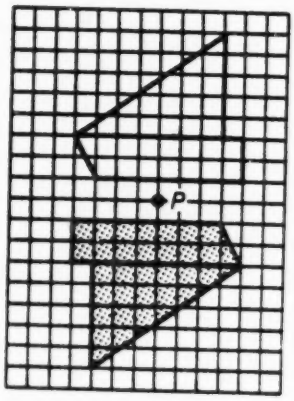
The figure is a rotation image of the top figure.

Practice • Use tracing paper. Is the shaded figure the rotation image of the unshaded figure?

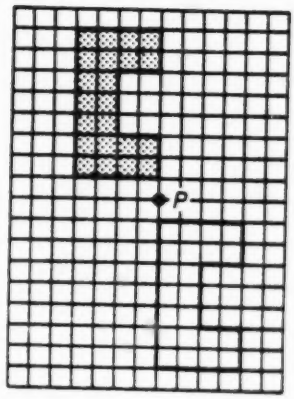
1.



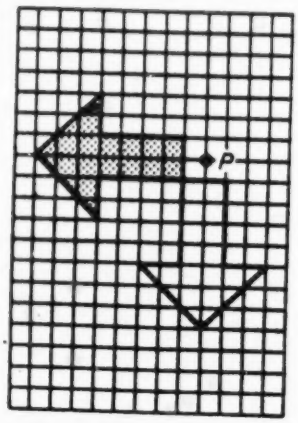
2.



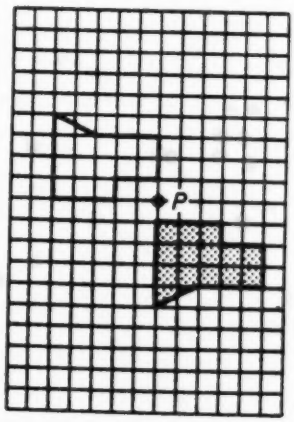
3.



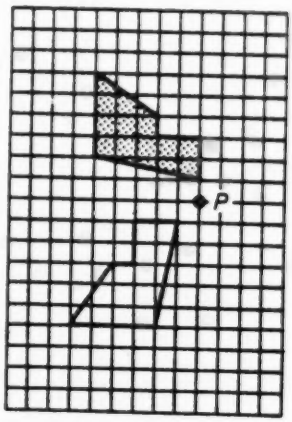
4.



5.



6.



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ENRICHMENT

WORKSHEET 118

Translation Images

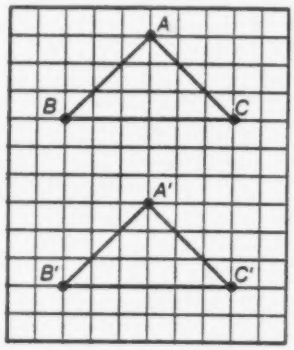
A **slide** moves a geometric figure to a new position.
Slide triangle *ABC* 6 units down.

Step 1 Mark point *A'* 6 units down from point *A*.

Step 2 Mark point *B'* 6 units down from point *B*.

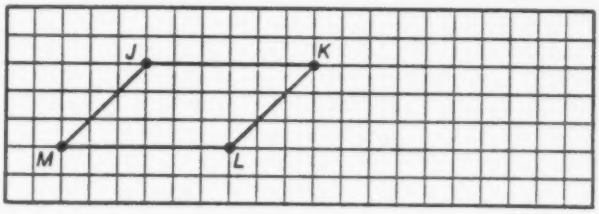
Step 3 Mark point *C'* 6 units down from point *C*.

Step 4 Connect the points you marked in order.

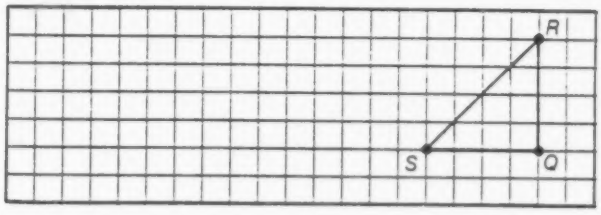


Draw the slide images.

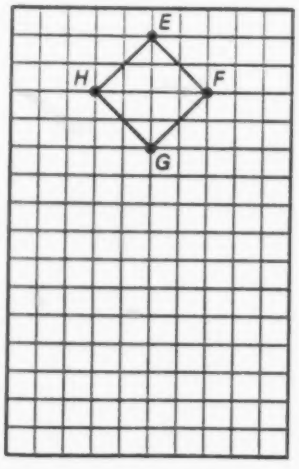
1. Slide figure *JKLM* 8 units to the right.



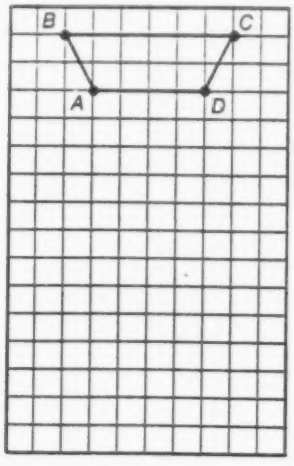
2. Slide figure *QRS* 14 units to the left.



3. Slide figure *EFGH* 9 units down.



4. Slide figure *ABCD* 12 units up.



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ENRICHMENT

WORKSHEET **119**

Rotation Images

The **rotation image** of a figure is a congruent figure that is placed in a different position.

For each polygon, draw a polygon in the same position and congruent to the given polygon. Then draw a polygon that is congruent to the given polygon but placed on its side.

1.

2.

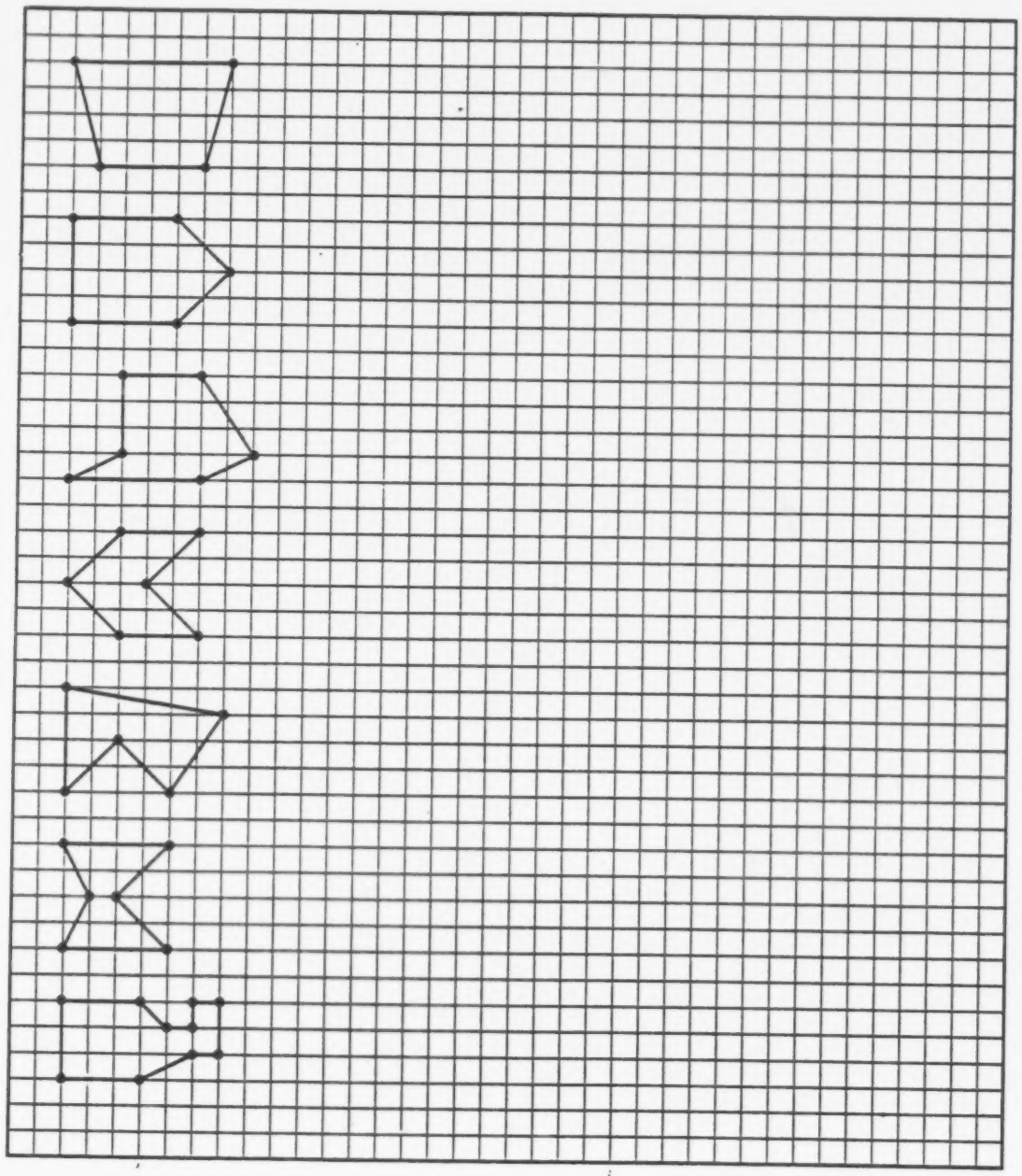
3.

4.

5.

6.

7.



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LESSON 16

SPIROLATERALS

CHECKLIST OF ACTIVITIES

_____1. READ: NONE

_____2. WRITE: NONE

_____3. DO COMPUTER ACTIVITY: PAGES 151-155

_____4. WRITE: NONE

LESSON 16

SPIROLATERALS

To draw a 10, 20, 30 spirolateral:

```
TYPE: FD 10 RT 90
      FD 20 RT 90
      FD 30 RT 90
      FD 10 RT 90
      FD 20 RT 90
      FD 30 RT 90
      FD 10 RT 90
      FD 20 RT 90
      FD 30 RT 90
      FD 10 RT 90
      FD 20 RT 90
      FD 30 RT 90
```

Your spirolateral should end at the same point at which you started. This spirolateral is an ORDER-3 SPIROLATERAL because 3 numbers are used as the length of the segments. The completed 10, 20, 30 spirolateral shows 4 rectangles fitting snugly around a middle point. This type of spirolateral is called TYPE A.

We can teach the turtle to draw spirolaterals by writing the following procedure:

```
TO SPIRO :FIRST :SECOND :THIRD
REPEAT 4 [FD :FIRST RT 90 FD :SECOND RT 90 FD :THIRD RT 90]
```

LESSON 16 - SPIROLATERALS

Try the following. Make sure the sketch the result.

1. DRAW SPIRO 30 20 10

2. DRAW SPIRO 20 50 30

3. DRAW SPIRO 10 30 40

4. DRAW SPIRO 20 10 30

5. DRAW SPIRO 50 10 40

A second type of ORDER-3 SPIROLATERAL will show 4 rectangles with a hole in the middle. This kind of spirolateral is called a TYPE B spirolateral.

Try the following. Make a sketch.

1. DRAW SPIRO 10 30 50

LESSON 16 - SPIROLATERALS

2. DRAW SPIRO 10 20 60

3. DRAW SPIRO 20 60 10

4. DRAW SPIRO 40 10 20

5. DRAW SPIRO 100 20 20

The last kind of ORDER-3 spirolateral will show 4 rectangles that overlap in the middle. This type of spirolateral is called a TYPE C spirolateral.

Try these. Make a sketch.

1. DRAW 20 40 50

2. DRAW 50 20 40

3. DRAW 40 20 40

4. DRAW 60 40 30

5. DRAW 30 70 50

Now complete the table below by creating some spirolateral of your own. The first row has been done for you.

TYPE A	TYPE B	TYPE C
10 20 30	10 30 50	30 40 50

NOW ANSWER THE FOLLOWING QUESTIONS.

1. Look at the numbers in column TYPE A. Without drawing, predict how you can tell if an order-3 spirolateral is TYPE A.

2. Look at the numbers in column TYPE B. Without drawing, predict how you can tell if an order-3 spirolateral is TYPE B.

3. Look at the numbers in column TYPE C. Without drawing, predict how you can tell if an order-3 spirolateral is TYPE C.

4. Without drawing, what type is each of these order-3 spirolaterals?

a. 10 15 5

b. 21 22 23

c. 100 32 25

d. 4 21 17

e. 1 1 1

f. 25 16 9

LESSON 17

REVIEW OF GEOMETRY

CHECKLIST OF ACTIVITIES

_____1. READ: NONE

_____2. WRITE: NONE

_____3. DO COMPUTER ACTIVITY: NONE

_____4. WRITE: PAGES 157-158

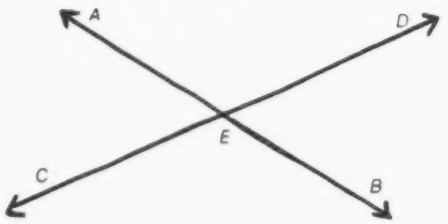
REVIEW

1. Name the point of intersection of $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$. (pp. 304–305)

2. Name two line segments on $\overline{AB}$. (pp. 304–305)

3. Name two rays on $\overrightarrow{CD}$. (pp. 304–305)

4. Name the angle formed by $\overrightarrow{EA}$ and $\overrightarrow{ED}$. (pp. 304–305)

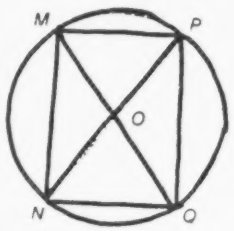


Measure the angles. Then write *right*, *acute*, or *obtuse*. (pp. 306–307)

5. angle AED

6. angle DEB

Use the diagram of the circle for exercises 7–14. (pp. 308–309, 314–315)



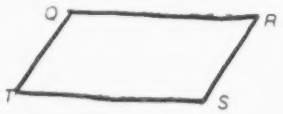
7.–12. Name the center of the circle, four radii, four chords, two diameters, four arcs, and four central angles.

13. Are angles NOQ and QOP complementary?

14. Are angles NOQ and QOP supplementary?

15. The measures of two angles of a triangle are 55° and 75°. What is the measure of the third angle? (pp. 320–321)

16. Figure $QRST$ is a parallelogram.
Name the congruent sides.
Name the parallel sides. (pp. 322–323)



Triangles LMN and WXY are congruent. Complete. (pp. 324–325)

17. $\overline{LN} \cong$?

18. $\overline{MN} \cong$?

19. $\angle M \cong$?

20. $\angle L \cong$?

21. The figures are similar. Find the missing length. (pp. 328–329)

22. How many edges does a triangular prism have? (pp. 330–331)

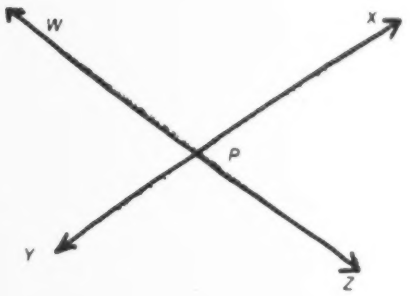
23. X and Y are angles. $\angle X$ and $\angle Y$ are supplementary. $\angle Y$ is an obtuse angle. What kind of angle is $\angle X$? (pp. 332–333)

1. Name the point of intersection of $\overleftrightarrow{XY}$ and $\overleftrightarrow{WZ}$.

2. Name two segments on $\overleftrightarrow{WZ}$.

3. Name two rays on $\overleftrightarrow{XY}$.

4. Name the angle formed by $\overrightarrow{PW}$ and $\overrightarrow{PX}$.

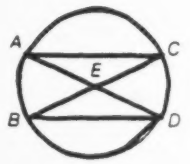


Measure the angles.
Then write *right*, *acute*, or *obtuse*.

5. angle WPX

6. angle XPZ

Use the diagram of the circle for exercises 7–14.



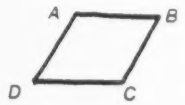
7.–12. Name the center of the circle, four radii, four chords, two diameters, four arcs, and four central angles.

13. Are angles BED and DEC complementary?

14. Are angles BED and DEC supplementary?

15. The measures of two angles of a triangle are 60° and 85°. What is the measure of the third angle?

16. Figure $ABCD$ is a rhombus.
Name the congruent sides.
Name the parallel sides.



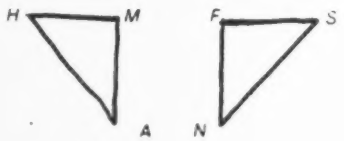
Triangles HMA and SFN are congruent.
Complete.

17. $\overline{HA} \cong$?

18. $\overline{MA}$?

19. $\angle H \cong$?

20. $\angle A \cong$?



21. The figures are similar. Find the missing length.

22. How many edges does a rectangular prism have?

23. M and N are angles. $\angle M$ and $\angle N$ are supplementary. $\angle N$ is a right angle. What kind of angle is $\angle M$?

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